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CONTENTS.

EDITORIALS:
Cultivating South American Trade..... 401
Independence of the American Electrical Manufacturer.. 402
Electrical Exports for the Last Fiscal Year..... 403
Safety Rules 403

DEPARTMENTS:
Commercial Practice 410
Electric Sign Data..... 415
Electrical Construction 416
Dollar Wiring Kinks..... 422
Public Service Commissions..... 423
Questions and Answers..... 425
New Electrical and Mechanical Appliances..... 436
Latest Approved Fittings..... 441
Current Electrical News..... 442
Record of Electrical Patents..... 447

LEADING ARTICLES:
Electricity in Office Buildings.—By T. D. Rose..... 407
Commercializing Electrical Advertising.—By Norman B. Hickox..... 410
Wiring Details of Taylor Sons & Company's Store..... 416
Construction Features of Cleveland Railway Shop..... 419
Minimizing Work When Making Arithmetical Calculations. —By N. B. Odell..... 420
Telephone Transmission in Its Relation to High-Tension Distribution.—By E. S. Moorer..... 427
Southeastern Section, National Electric Light Association 433
BOOK REVIEWS 435

MISCELLANEOUS:
Electrical Exports for June and For the Fiscal Year Ending 1913-1914 404
Joint Pacific Coast Convention..... 404
Activities of the Society for Electrical Development..... 404
Frederick Bedell 405
Kelvin Memorial Fund..... 406
Dayton Jovians Active..... 406
Jury of Award for Brady Memorial Safety Medals..... 406
Foreign Population Reached in New York..... 413
Unique Demonstration of Washing Machine..... 413
Central-Station Float in Civic Parade..... 414
Massachusetts Contractors Meet and Arrange for Annual Convention..... 418
Safety Rules for the Operation and Maintenance of Electrical Supply Utilities and Handling Electrical Equipment 418
Among the Contractors..... 421
Electric Club-Jovian Outing..... 431
Hydroelectric Power Development in Germany..... 432

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CULTIVATING SOUTH AMERICAN TRADE.

Manufacturers of electrical and related apparatus in this country who have never paid much attention to the possibilities of cultivating South American trade will do well to investigate this outlet for their products under present conditions of international commercial affairs. Some excellent suggestions were advanced a few days ago by Mr. H. S. Dudley, president of the River Plate Trading Company, of New York and Buenos Ayres. In answer to a question as to what obstacles lie in the way of trade development in South America at present, Mr. Dudley said that there are none so far as South America is concerned, but a great many on the part of the American manufacturer who either cannot or does not want to understand that there are ways of carrying on a successful business other than those which he, together with many others, have instituted as standards in this country, and which are wholly inadequate for successful operations elsewhere.

Each manufacturer must decide for himself whether his goods are likely to be salable, and in doing this he must consider the topographical and climatic conditions and the chief activities of the inhabitants. If he decides that his goods are salable he should dispatch a complete line of samples, either with his own representative, who should be prepared to stay in the country for a considerable length of time, or else to some responsible American firm doing business in South America and having proper facilities for exploiting his line. The fullest co-operation should be accorded representatives. With such a firm, the manufacturer should place on consignment a sufficient stock of goods to thoroughly supply the immediate demands resulting from this preliminary selling campaign and to take care of his market until such time as goods ordered from the United States can reach the purchaser. At these critical times such prices should be made as to convince the purchaser of the manufacturer's intention to do everything he can to secure a permanent foothold in that territory.

The granting of reasonable credits is an important point, based either on knowledge of the representative or of direct negotiation with the purchaser himself. There is no need, according to Mr. Dudley, of the manufacturer's making any sacrifices nor as a matter of fact any concession other than a disposition to depart from his present methods where necessary, and to adopt credit systems which are at

present in force in South America and which have always been satisfactory to other nations dealing with this trade. It is futile to send anyone in quest of such trade unless he knows the language and unless he is acquainted with the manners, dispositions and individual characteristics of the people with whom he expects to deal. A thorough conversational knowledge of Spanish, and in Brazil, of Portuguese, is absolutely essential.

Experienced observers of trade conditions in foreign countries realize the immense importance of following the instructions of the purchaser in the most minute details with respect to packing, times of shipment, and types of apparatus selected. The substitution of products "just as good" or the "equivalent of" that which was ordered, is likely to kill foreign trade the first time it is tried. If the consumer wants his electric meters wrapped in oiled paper of brown tint it will not do to ship the apparatus otherwise, and if the South American supply dealer asks for motors with a normal speed of 1,450 revolutions per minute, it is running a decided risk to ship him machines designed for say 1,250 turns. It will not do to assume that the Spanish-American purchaser is prepared to adapt himself to what often seem, from North American viewpoints, minor changes, but too much emphasis cannot be laid upon sending him exactly what he orders, with complete instructions in the language of the purchaser as to assembly and operating care, and in precisely the form requested. Too many American manufacturers have lost foreign business through neglect of these, to them, non-essentials. In a large sense, the language of electricity is international, and electrical apparatus producers in this country ought to find the present a time of great opportunity in the extension and resulting permanent retention of profitable business in the South American field.

The Government seems inclined to do all in its power to assist our manufacturers in obtaining South American and Central American trade. The Bureau of Foreign and Domestic Commerce has recently prepared three bulletins which should be of assistance to manufacturers. These are entitled "Transportation Rates to the West Coast of South America;" "Trade Directory of South America;" and "South America as an Export Field." Another bulletin, "Banking and Credit in Argentina, Brazil, Chili and Peru," is now in preparation. These are but a few of the many publications of this Bureau devoted to the development of foreign commerce. Congress has recently made a special appropriation for this Bureau for promoting commerce in Central and South America, and this fund of $50,000 is to be used to reinforce the existing service for the development of a Latin-American trade. Trained agents of the Bureau will investigate markets for special lines of exports and commercial attachés of the Bureau will be stationed at Rio Janeiro, Buenos Aires, Santiago and Lima, as soon as suitable appointees are secured. In addition to its branch offices in New York, Chicago, New Orleans and San Francisco, the Bureau has recently opened branches in Boston and Seattle.

The opening of the Panama Canal to commerce should reduce freight charges to the West Coast of South America and make it possible to handle this trade with a lesser number of vessels than would otherwise be required. The opening to American registry of foreign-built vessels should result in the transfer to the American flag of numbers of American-owned vessels heretofore sailing under other colors. The Washington administration has also indicated its intention to assist in providing freight steamers which shall be available for the South American trade.

INDEPENDENCE OF THE AMERICAN ELECTRICAL MANUFACTURER.

America is fortunate in being a land of large area and varied natural resources. Between the shores of the Atlantic and the Pacific are to be found nearly all forms of mineral wealth and nearly all animal and vegetable products which can be cultivated in the temperate zone. When international trade is interrupted, as in the present stress of the European conflict, it is a decided advantage to any nation to have within its borders the sources of raw materials necessary for carrying on its established industries.

The electrical industry of this country uses raw materials nearly all of which are produced within its own borders. The two greatest requisites, iron and copper, are found here more abundantly than anywhere else in the world, and their production occupies two of our largest industries. Next in importance to these are the insulating materials. While some mica is imported, there are deposits in this country and Canada sufficient to supply the trade. Of the fibrous and resinous insulating materials, those which are not produced in this country are imported principally from Asia, and this trade should not be interfered with by the war.

Rubber, however, is an important insulator which cannot be produced in this country, although an attempt to grow substitutes has been made in Texas, and more particularly in Mexico. The best rubber for electrical purposes, comes, however, from South America, and if adequate transportation facilities are provided, it should form one of the desirable return cargoes for the ships carrying American manufactures to that continent.

With respect to some of the minor materials used in electric manufacturing, however, this country is not independent of Europe. The principal source of platinum still remains in Russia, and the delivery of this commodity will no doubt be interfered with by the war. Of late, however, it has been shown that tungsten can be used in many applications in place of platinum, and a failure of the latter metal should stimulate a greater application of the former. Tin, an important constituent of solder, comes principally from the Straits Set-

tlements, and importations from here and the island of Banka, in the Dutch East Indies, are likely to be interfered with, at least temporarily. Wales is another important tin producer, but the production of tin in Wales has already been cut in half and may be further restricted with the progress of the war. Moreover, commerce with England is likely to be difficult on account of the danger from war vessels of other nations and from the requisitioning of commercial British bottoms by the British Government. The price of tin is already soaring and the available supply in this country is decidedly limited. Some difficulties may consequently be experienced on this score.

Taking it all in all, however, the American electrical manufacturer is in a decidedly advantageous position with respect to his supply of raw materials. Providing markets are available for his product and transportation difficulties do not intervene, the industry should find little difficulty arising from war conditions in the transaction of its business.

ELECTRICAL EXPORTS FOR THE LAST FISCAL YEAR.

The active movement for the promotion of our export trade which has been undertaken in the last few weeks on account of the European war, gives special interest to the official figures of our foreign commerce, as disclosed by the totals of the fiscal year ended June 30, 1914. On another page of this issue we have given our usual report on the electrical exports during the month of June and for the fiscal year just referred to. These are based on the statistics furnished by the Bureau of Foreign and Domestic Commerce, and while classified as to the main groups of electrical shipments, the countries of destination are not given.

For the fiscal year 1913-1914, the total value of electrical shipments is given as $25,060,844, which is a decrease of about five per cent from the total of the preceding fiscal year. While this decrease is not so very serious and is largely explained by an almost world-wide depression in commercial circles, it is, nevertheless, an unfortunate retrograde tendency from the steady upward trend that has been noticed since the year 1908-1909. The figures for the individual months of the fiscal year show that the electrical shipments in the last six months of 1913, with one exception, greatly exceeded those of the corresponding months of 1912; thus the diminution of the electrical export trade did not set in until early in the present calendar year. In fact, the first six months of 1914 show, each of them, a more or less marked decrease in electrical totals compared with the corresponding months of 1913, and moreover, this decrease for the latter half of the fiscal year was slightly greater than the increase in the first half of the year.

Along with the general depression in international trade referred to, there was a special situation causing the decrease in the early months of this year. This was the state of unrest in Mexico, which reached a climax in April, when the seizure of Vera Cruz was effected. Mexico has been a good purchaser of electrical materials, its total imports of American electrical products during the fiscal year 1912-1913 amounting to nearly $2,000,000. Now that the late disturbance in that unhappy country has largely been settled by the withdrawal of Huerta, the resumption of Mexican business should be shown by material increases in shipments to that country by American exporters.

With the conclusion of the fiscal year, the Government statistics on electrical shipments have been given for the first time for a full year in more classified form than heretofore. During the year four subdivisions were added, thus reducing the mysterious "All Other" class, which consisted of all miscellaneous electrical products not given in the 12 subgroups now reported each month. While a further subdivision may be desirable, probably a more urgent need in the Government reports is a reversion to the custom formerly followed of giving the principal countries to which these shipments were made. For a very large number of export products the principal countries of destination are given in the Government reports, and many of these classes of products total very much less per annum than the total of the electrical shipments. With the actual figures showing the electrical shipments to our principal customers available, a better study of the course of the export trade can be made.

To the figures referred to above there must also be added certain electrical shipments that are not classified in the main group of electrical exports. Among these special classes are electric locomotives, which during the fiscal year just referred to, totaled 48 units and were valued at $437,452. The total value of automobiles, both commercial and passenger types, during the fiscal year amounted to $26,574,574, of which a considerable portion no doubt were electrical, although the statistics at hand give no suggestion as to what that proportion may be.

SAFETY RULES.

The use of electricity at high and even at medium voltages is necessarily accompanied by some hazard to both life and property. It should be the aim of every one connected with its use to reduce this hazard to the lowest possible point. With respect to the fire hazard, the National Electrical Code aims to do this, but while different organizations and individuals have done much to prevent accidents and loss of life there has been no such general application of rules for reducing the life hazard.

Now the Bureau of Standards has come forward with a set of safety rules which is referred to elsewhere in this issue.

Electrical Exports for June and for the Fical Year 1913-1914.

The Bureau of Foreign and Domestic Commerce, Washington, D. C., has published its monthly summary of the imports and exports in June and thus completed its report of foreign commerce for the fiscal year ended June 30, 1914. From these statistics are obtained the following data on the electrical exports of the United States during the two periods named.

Electrical shipments in June, 1914, show a very striking decrease in total value, compared with the corresponding month in 1913 and also as compared with May and other months of the fiscal year. For the four classes for which the number of articles exported is given, there were shipped in June: electric fans, 1,632; arc lamps, 232; carbon-filament lamps, 19,009; metal-filament lamps, 69,440.

The detailed figures for the month, together with those of June, 1913, are reported as follows:

	June, 1914.	June 1913.
Batteries	$ 58,521	.....
Dynamos or generators	199,955	$ 283,386
Fans	22,717	27,330
Insulated wire and cables	74,294	.....
Interior wiring supplies, etc. (including fixtures)	51,354	.....
Lamps—		
Arc	3,952	4,574
Carbon-filament	3,094	29,413
Metal-filament	15,719	23,869
Motors	231,003	308,742
Static transformers	75,392	.....
Telegraph instruments (including wireless apparatus)	26,962	10,094
Telephones	69,717	134,196
All other	617,757	1,493,128
Total	$1,450,437	$2,314,732

The following table gives the totals of electrical exports for the 12 months of the fiscal year, 1913-1914:

Month.	Electrical Exports.
July, 1913	$2,318,502
August, 1913	2,279,015
September, 1913	2,254,254
October, 1913	2,516,583
November, 1913	2,243,460
December, 1913	2,233,990
January, 1914	1,947,646
February, 1914	1,930,513
March, 1914	2,104,332
April, 1914	1,741,551
May, 1914	2,040,720
June, 1914	1,450,437

In the following table are given the totals for the last eight fiscal years:

Fiscal Year.	Electrical Exports.
1906-1907	$17,268,406
1907-1908	15,249,436
1908-1909	12,524,311
1909-1910	14,742,395
1910-1911	18,727,455
1911-1912	20,169,362
1912-1913	26,772,816
1913-1914	25,060,844

Joint Pacific Coast Convention.

The Northwest Electric Light and Power Association and the American Institute of Electrical Engineers will hold meetings in Spokane, Wash., on September 9, 10 and 11. In addition to the papers mentioned in our issue of August 8, there will be one presented before the Northwest Association by J. E. Davidson entitled "Electric Pumping Plants in Rural Districts." The program of the American Institute will include a paper by G. B. Rosenblatt entitled "Application of Electric Motors to Gold Dredges," and one by A. H. Babcock entitled "Report of the Work Done by the California Joint Committee on Inductive Interference."

There will be a joint opening meeting on the morning of Wednesday, September 9, and a joint tehnical session on the afternoon of Thursday, September 10. The American Institute will hold separate sessions on Wednesday afternoon, Thursday morning, Friday morning and Friday afternoon. The Northwest Association will hold separate sessions on the same days, winding up with an executive session on Friday.

There will be a joint smoker of both societies on Wednesday evening and a joint banquet on Friday evening. On Thursday evening there will be an illustrated lecture for the members of both associations on "The Electrical Features of the Panama-Pacific Exposition," by A. H. Halloran, of San Francisco.

On Wednesday afternoon there will be a reception at the Davenport Hotel for visiting ladies, and on Thursday afternoon an automobile trip to the Country Club. On Friday afternoon there will be an automobile trip to Hayden Lake with afternoon tea at Bozanta Tavern. There will be a theater party for the ladies on Friday evening.

The two days following the convention, September 12 and 13 will be devoted to excursions to Little Falls and Long Lake, where the plants of the Washington Water Power Company are located, and to a trip over the Inland Empire Railway to the Palouze country.

Activities of the Society for Electrical Development.

The active work of the Society for Electrical Development, Incorporated, has been going on for several months with increasing momentum. Its activities are steadily broadening and in a recent report favorable results are noted from some of the Society's work.

A recent undertaking by the Society has been the preparation of specimen wiring specifications, which are to be distributed freely among architects in the effort to give them practical suggestions for complete provision for electric service and proper lighting in buildings of various types. The Society is co-operating with the Electric Vehicle Association of America in the efforts to induce central stations to improve facilities for charging electric vehicles. Data on vehicle charging are also being gathered. Information is being obtained in regard to electric heating and cooking appliances and various electrical household devices. The manufacturers of such equipment and central stations are co-operating with the Society in increasing the use of electrical household devices. The Society has undertaken to furnish for a number of trade publications a series of articles on the electrical equipment of dry goods and department stores, proper methods of window display, interior lighting, electric elevators, and a great many other subjects which should prove of interest to all merchants desirous of making use of the most modern methods. The Society will continually broaden its dissemination of authentic information on the subject of electricity for light, power and other uses.

War Affects Copper Production.

With the possible exception of the silver industry, the copper industry will probably feel the injurious effects of the European war more seriously than any other of the leading American metal industries. During the last five years approximately 50 per cent of the copper turned out by American refineries has been exported, in large part to the countries now involved in the European war, according to the United States Geological Survey. Some of this copper has been imported for metallurgical treatment, and the imports will probably be somewhat restricted on account of shipping conditions.

During these five years, however, domestic consumers have taken only about 63 to 67 per cent of the copper produced from mines within the United States, so it is evident that there must be a material curtailment of production while present conditions prevail. Considerable copper is, of course, consumed in munitions of war and for other military purposes, but the constructive arts of peace are far more favorable for the copper industry than the destructive art of war.

American producers have already greatly curtailed their production.

Arch Lighting.

The present strings of lights on Windward Avenue, Venice, Cal., are to be abolished and arched lights put in. At the junction of Windward Avenue and the Trolleyway a special electrically lighted arch is to be built. This is to be surmounted by a clock which will be lighted up at night. At the city limits another arch is to be constructed which is to be brilliantly illuminated and it will be surmounted by the word "Venice," which will be lighted up every night.

Frederick Bedell.

Few men have contributed more to our knowledge of the phenomena underlying the manifestations of electrical energy than the subject of this sketch, Frederick Bedell. An ardent student and investigator, he has the happy faculty of expressing his views and presenting his ideas in the most lucid and understandable fashion. A number of his contributions to the literature of the subject are considered classics, and as an inventor, designer and instructor he has achieved a remarkable degree of success.

Frederick Bedell was born in Brooklyn, N. Y., on April 12, 1868. His father, Edwin F. Bedell, an iron manufacturer, was a member of the firm of Cooper, Hewitt & Company and secretary of the New Jersey Steel & Iron Company. His mother, Caroline L. Cunningham (Bedell) is still living. His boyhood was spent at Montclair, N. J., where he attended the public schools, graduating from high school in 1885. He took the classical arts course at Yale University, graduating in 1890 the third in his class of 150 with the degree of A. B. He received honors in physics, a prize in mathematics and, in his junior year, an appointment to a philosophical oration entitling him to an election to the honorary literary society, Phi Beta Kappa.

After graduating from Yale, he pursued graduate studies in science and engineering at Cornell University, where he was fellow in electrical engineering in 1891-1892. He received the degree of Master of Science in electrical engineering in 1891, and Doctor of Philosophy in 1892 from Cornell University. In 1891 he was elected a member of the honorary scientific society of Sigma Xi. He was connected as a teacher in the department of physics at Cornell University, and instructor in physics in 1892-1893, assistant professor of physics from 1893 to 1904, and professor of applied electricity from that time on. In 1901-1902 Professor Bedell spent the year abroad on sabbatic leave, and eight months in 1910.

He has been a member of the American Physical Society since its first meeting in 1899. He has been an active participant in its proceedings and was one of the three editors of the *Physical Review* from its foundation in 1893 through 1912, during which period the publication was controlled by Cornell University. In 1913 he was appointed its managing editor, when the American Physical Society accepted its control as offered by the editors on behalf of Cornell University.

Professor Bedell became a member of the American Association for the Advancement of Science in 1892, later on being made a fellow. He has contributed many papers to the Association, his first paper being presented at the Madison (Wis.) meeting in 1893. He was secretary of Section B (physics), in 1897, secretary of the council in 1898, and general secretary of the Association in 1899.

He was elected an associate member of the American Institute of Electrical Engineers in 1891, and a member in 1896. He is now a manager for a term of three years. He has been a member of various committees, including the Library,

Frederick Bedell,
Professor of Applied Electricity, Cornell University.

Standards and International Electrotechnical Committees. For the present administrative year, 1914-15, he is a member of the Sections and Electrophysics Committees.

For some time Professor Bedell was a member of and presented several papers before the Physical Society of London, the British Association for the Advancement of Science, the American Society of Mechanical Engineers and the Franklin Institute. He was a member of the International Electrical Congress held in Chicago in 1893, and a contributor to its proceedings and a member of the International Electrical Congress in St. Louis in 1904. He was also a member of the Jury of Awards in the Department of Electricity, Louisiana Purchase Exposition.

In 1892 Professor Bedell published, jointly with Dr. Albert C. Crehore, his first book entitled "Alternating Currents, an Analytical and Graphical Treatment for Students and Engineers." This was a pioneer work in its field and was immediately translated into French and German, and was used in many technical schools in France and Germany as well as in America. Since that time the book has passed through many subsequent impressions and is still regarded as a classic among books on mathematical electricity. Special mention should be made of his paper before the International Electrical Congress in 1893, entitled "Transformer Diagrams Experimentally Determined," and his paper before the Franklin Institute, jointly with H. J. Ryan, entitled "Action of a Single-Phase Synchronous Motor." With E. L. Nichols, in 1894, he published a work entitled "A Laboratory Manual of Physics and Applied Electricity," and in 1896 came "The Principles of the Transformer." More recently he issued a volume entitled "Direct and Alternating-Current Testing," and an enlarged and more comprehensive edition appeared later on under the title "Direct and Alternating-Current Manual."

Professor Bedell has contributed many articles, either experimental or theoretical, to scientific and technical journals, and to the proceedings of learned societies. In 1895 he was the special contributor of articles on magnetism, magnetism of iron and transformers, to Johnson's Universal Encyclopoedia. He contributed the definitions of electrical units in two editions of the Standard Dictionary, and prepared the electrical definitions for the recent revision of Webster's International Dictionary. He is the inventor and patentee of various improvements in telegraphy, telephony and power transmission, including a system for the joint transmission of direct and alternating currents. His chief work in investigation has been in the field of alternating currents, theoretical and experimental, and his university instruction has been largely in this same field. From 1892 on his laboratory has been an active one in the development of this subject and many of the men who have come from it are now in the front rank as engineers and investigators. The general utilization of alternating-current apparatus for generating, transmission and industrial application has created a vast field for their operations.

Kelvin Memorial Fund.

The expenses connected with the erection of a window in Westminster Abbey as a memorial to Lord Kelvin amounted to approximately $6,000. The fund which was subscribed by contributors in all parts of the world exceeded this amount by over $2,300. The committee having charge of the fund has recommended that the balance be applied to the establishment of a Kelvin Gold Medal to be awarded triennially as a mark of distinction in engineering work or investigation of the kinds with which Lord Kelvin was especially identified.

The Institution of Civil Engineers is to be requested to accept the trust and administration of the fund. The award is to be arranged by a committee in London to consist of the presidents for the time being of the Institution of Civil Engineers, the Institution of Mechanical Engineers, the Institution of Electrical Engineers, the Institution of Naval Architects, the Iron and Steel Institute, the Institution of Mining and Metallurgy, the Institution of Mining Engineers, the Institution of Engineers and Ship Builders in Scotland.

The first award of the metal is to be made in the spring of 1915.

Dayton Jovians Active.

The Dayton, O., Jovian League's special committees, charged with supervising the arrangements for outings and entertainments, have been rather busy recently, the picnic committee handling the recent outing at Schwind Woods, on August 22, in splendid fashion, and the committee in charge of the coming rejuvenation, to be held on September 15, reporting fine progress for that event. The outing was an unqualified success, a large proportion of the membership of 200 attending and enjoying the various sports and games which made up the program. This number will be largely added to at the big rejuvenation in September, however, as several candidates for initiation have already been secured. The affair is expected to be one of the biggest which the organization has ever held, and a number of special features, including a banquet, are being arranged.

Water-Power Bill Passes House.

The House of Representatives has passed the Ferris bill for the development of water power on the public domain of the United States. The bill gives the Secretary of the Interior authority to make leases for a period of 50 years for development of such water power, the leases to terminate at that time and be taken over by the government at a fair valuation unless renewed.

Action Against Telephone Company for Failure to Include Name in Directory.

The New York Telephone Company has been made defendant in a novel case brought by N. H. Berger, Newark, N. J., in the Court of Chancery, asking damages for the annoyance and loss of business due to the failure of the company to properly include his name in the telephone directory. The bill of complaint sets forth that following a contract the listing was properly given until May, 1913, when upon issuance of a new directory such was omitted; following in the October issue of the directory of the same year the complainant's name appeared with the number Market 2069 instead of Market 2969. It is further alleged that the company now takes the position that his contract does not entitle him to have his name printed in the directory.

Jury of Award for Brady Memorial Safety Medals.

In our issues of March 14 and June 27, 1914, mention was made of the arrangements concluded by the family of the late Anthony N. Brady, the American Museum of Safety, and the American Electric Railway Association for the award of the Anthony N. Brady Memorial Medals to the electric railway company and its official that has been most active in the promotion of safety.

The jury of award has now been designated. It consists of: Bion J. Arnold, chairman, Board of Supervising Engineers, Chicago; Jas. H. McGraw, president, McGraw Publishing Company, New York City; W. J. French, commissioner, Industrial Accident Commission of California; Geo. F. Swain, chairman, Boston Transit Commission; Frank J. Sprague, consulting engineer, New York City.

By the conditions of competition, as formulated by the committee, August 31, 1914, was set as the final date by which all returns should be in the hands of the secretary of the committee. This competition has attracted great interest throughout the country.

Telephone Fire.

A remarkable exhibition of bravery was given on August 23 by two Bell telephone operators in Braddock, Pa. A fire started in the first floor of the building, of which the telephone office occupied the second floor. Miss Margaret Mulhern, of Homestead, and Miss Eleanor Regan, of Swissvale, were the first to discover the fire, but they stuck to their posts until the heat cracked the floor beneath them and could not be endured longer. Then, only, did the girls leave.

Important Power Contract.

A five-year contract for furnishing electricity to Suffolk County, for the use of the court house in Boston, has been awarded to the Somerset Company at a rate of four cents per kilowatt-hour. The contract amounts to about $5,000 a year. The company furnishes lamps and all necessary apparatus.

Heretofore the rate has been six cents per kilowatt-hour, energy being furnished by the Boston Edison Company.

The Somerset Company was organized in May, with a capital stock of $50,000, to buy, sell and deal in engines, generators, lubricators, and steam and electrical specialties, and to buy and sell any articles used or capable of being used in connection with that business. The president is Jeremiah J. Hurley, 2 Columbia Street, Boston; treasurer, Alvah J. Shepherd, 27 State Street, which address is the Somerset Company's office.

The company has a generating station in connection with a hotel property at the corner of Somerset and Howard Streets. It is stated that contracts have been secured to light several office buildings in the same block and that the connections are to be made through the court house property. The crossing of any street not being required, the company does not come within the jurisdiction of the Gas and Electric Light Commissioners.

Mr. Hurley, president of the Somerset Company, stated that the existing plant is of sufficient capacity for present needs, but that it will be enlarged if required.

Telephone Lines Ordered Underground.

Mayor Green, of Urbana, O., has ordered the contractor engaged in paving work on Main Street in that city to stop operations until the Urbana Telephone Company and the Central Union Telephone Company have fulfilled their agreement to remove their poles and place their lines underground. The city authorities declare that the telephone companies have had ample time to do this, and that no arrangement by which the poles will be removed after the paving is completed will be satisfactory.

Electricity at State Fair.

A searchlight, 2,000 lamps of 25 candlepower, and a battery of 1,000-candlepower incandescents, a total of 100,000 candlepower of illumination by electricity, supplied by the local lighting company—this prospect is a special feature of the inducements offered to visitors to the Kansas State Fair at Topeka, Kans., on September 14 to 18.

Electricity in Office Buildings.

By T. D. Rose.

This article presents data on the use of central-station energy in office buildings with special reference to elevator service, lighting, ventilation pumping and refrigeration. Interesting comparative data are given on electric and hydraulic elevators.

In looking into the application of electricity to office buildings, we find the following uses of power: elevator service, illumination, supply of house water, supply of drinking water, ventilation and vacuum cleaning. All of these uses should be considered separately in each particular case, but by a general outline of the conditions met with in everyday practice, considerable benefit could be derived.

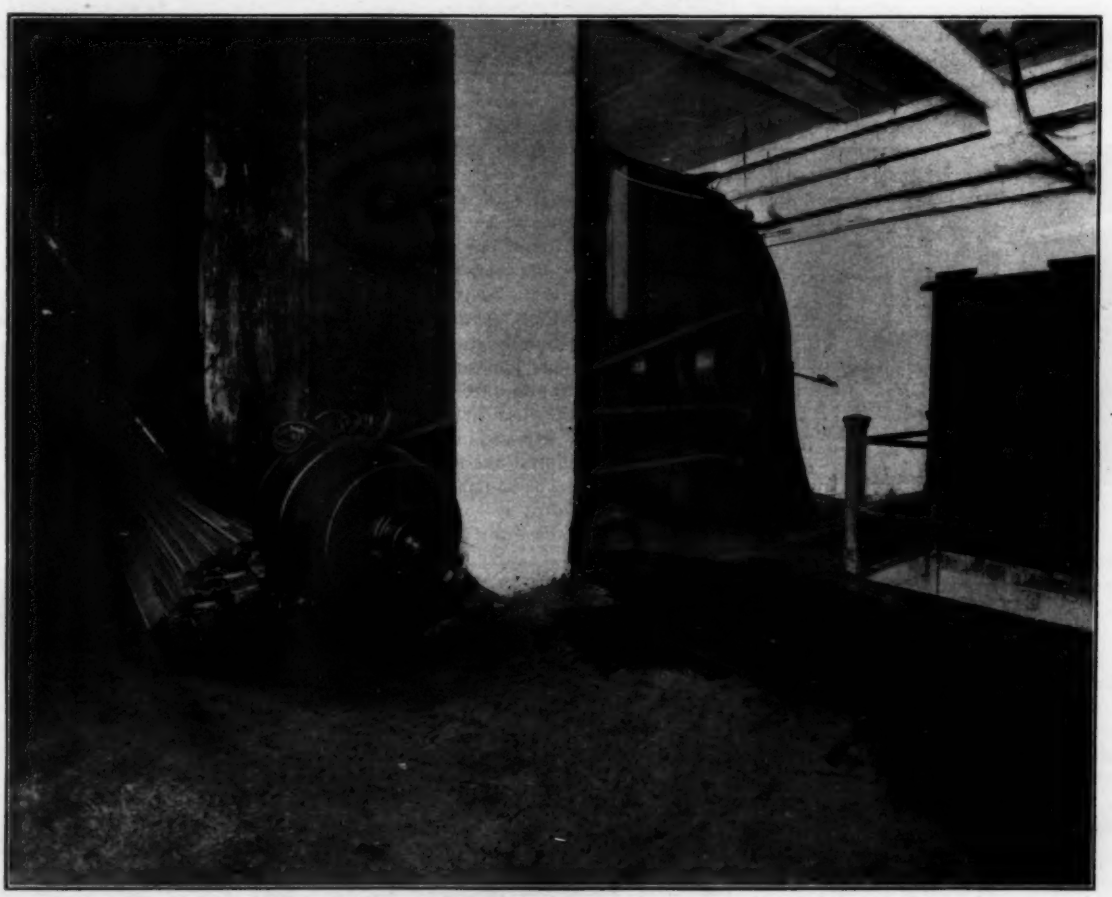
A careful study has been made of the operation of such buildings from both central station and private-plant service, and certain observations have been made which are of considerable value to the engineer working on such installations, and are of considerable interest to any one interested in the application of electricity.

We will take up the various uses in the order named.

The elevator service in any building is of utmost importance, for on it depends, to a great extent, the attitude of both the tenants and the public towards the management of the building. There must be a sufficient number of machines to take care of the maximum peak upon the system, and, combined with this, they must have speed and safety in operation. The maximum peak occurs twice a day, in the early morning and at noon, and in order to handle this satisfactorily, there must be a sufficient number of machines of sufficient speed to be capable of completely filling the building in thirty minutes. This we might say is absolutely essential for an elevator installation in any building.

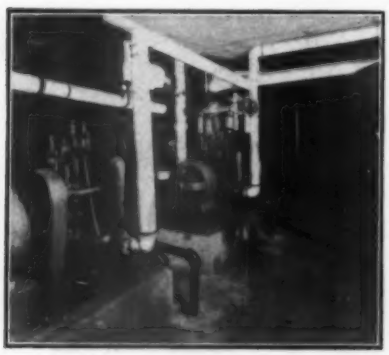
There are two general types of elevators in use today: the hydraulic and the electric. The electric machine is coming more and more into use, for when compared with the hydraulic machine from every viewpoint, it shows a decided advantage. Its first cost is less, its operating cost is less, it can attain a higher speed in a shorter length of time, and can come to rest from full speed in a shorter length of time with less jar and bouncing. When looked at from the viewpoint of safety, both types are about on a par, except that the electric machine, due to its inherent characteristics, can be so easily equipped with many safety devices that cannot be applied to the hydraulic machine. The advance of the electric machine is seen by the fact of its installation in the modern buildings that are now being erected.

From observations made on the operation of elevators in various office buildings it has been found that the travel per day is between 10 and 15 car-



Ventilating Fan Driven by a 15-Horsepower Motor.

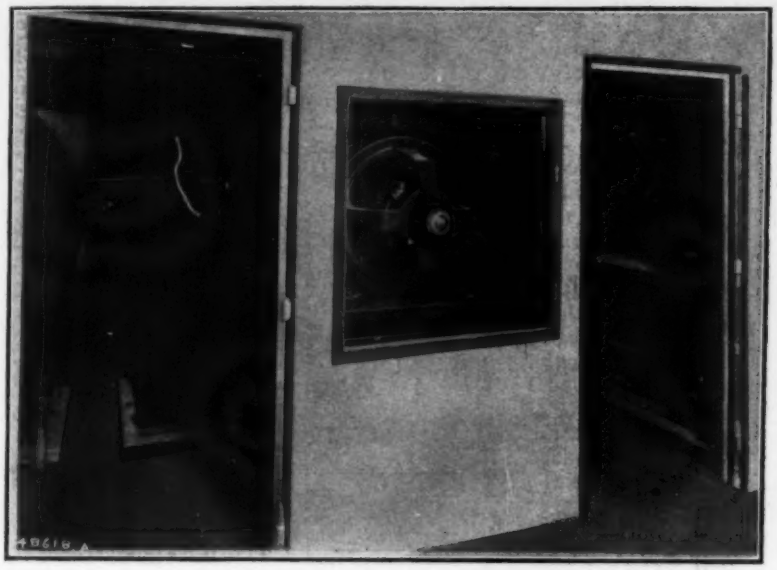
miles, as shown by the data on buildings in Baltimore, Table I. This means that a building having four elevators operating continuously all day will have a total travel of about 50 miles. The consumption of power varies, of course, with the amount of the live load carried and the frequency of the stops. Consider an electric traction car running steadily at a certain number of stops per mile. Start first with the car running light and gradually increase the load up to the capacity of the car. The consumption of power per car mile, as registered by a meter, will be found to be at first rather high. As the live load increases the consumption per car mile will drop until a point is reached which corresponds to the live load which actually balances the counterweight. This is the point that the designers of elevators calculate as the average operation of the car and design a counterweight of sufficient size to balance as nearly as possible the average live load to be carried. As the live load is increased beyond this point the consumption per car mile is increased, the work being done against the live load now, rather than the counterweight, as was the case with light loads. In actual operation it is found that the average figure for this consumption amounts to about four kilowatt-hours per car mile.



Motor-Driven Pumps.

The maximum demand for such service varies, of course, with the number of cars, but it has been found that the one-half hour demand does not exceed 10 kilowatts per elevator. This maximum demand occurs early in the morning and at noon, so does not coincide with the lighting peak. The figure of 10 kilowatts per elevator applies to the morning and noon peaks, but the demand occuring in the afternoon coincident with the maximum lighting peak would be only about 8 kilowatts per elevator.

To illustrate the relation between the consumption per car mile and the demand, figured upon the half-hourly basis, let us take the curve showing the elevator trips per half-hour, shown in Chart 1, and from it plot a curve of the demand in kilowatts. Take the high point of 72 trips per half-hour and multiply it by 400 feet, this being the distance traveled per trip. This gives a total travel of 28,800 feet, or 5.45 miles. Assuming a consumption of four kilowatt-hours per car mile, we get a total consumption of 21.8 kilowatt-hours for the half-hour. This is equivalent to an average load of 43.6 kilowatts. The building has five elevators and therefore has a demand of 8.7 kilowatts per elevator, as compared to 10 kilowatts per elevator, as stated above. By this method we can find the average demand during any period of the day, and thus plot a demand curve.



Motor-Driven Ventilating Equipment.

All of the above figures apply to the electric elevator, but the hydraulic elevator, when operated by motor-driven pumps, presents an entirely different problem. The recent improvements in the centrifugal pump have greatly simplified the question, for the low starting torque required, and the fairly good efficiency when working at a head for which it has been designed, make its direct connection to an electric motor and its intermittent operation by means of a pressure regulator a very satisfactory source of hydraulic press-

Electric Elevator Installation Showing Motor and Control.

ure. Tests have shown that such an equipment requires approximately 10 kilowatt-hours per car mile, and has a half-hour demand of between 40 and 50 per cent of the capacity of the motor.

The illumination of any building depends, of course, upon its general structure. The modern tungsten lamp finds its best market in modern office buildings. The management of office buildings quickly realized the advantages of this lamp, and, as a result, we have seen its adoption to this character of service. In figuring the installation of lamps in a new office building, a fair basis to work on is one 50-watt equivalent to every 30 square feet of rentable area, or 1.5 watts per square foot. As shown in Table II, this will be found to conform to the needs of such buildings and to general practice. The monthly kilowatt-hour consumption of lighting service varies from month to month, as shown in Chart 2, being higher during the winter season, but the average figure for the yearly operation will be found to approximate the equivalent of 2.5 hours use of connected load per day, or 70 hours use per month, This corresponds to from 3 to 3.5 kilowatt-hours per 50-watt equivalent per month.

The consumption of power in the supply of house water for the building does not amount to a very large percentage of the total power used. The usual method of applying this power electrically is by means of the motor-driven centrifugal pump, operated automatically, the water being pumped to a tank on the roof, and the level of the water in the tank held above a certain point by the use of a float switch and automatic controller in the motor circuit. By this method the motor runs only a part of the time, thus cutting down the cost of operation. It is found that with such an equipment the equivalent operation of the pump amounts to only about five hours running per day at full load. The capacity of pumps sufficient to carry the loads called for in buildings of the size now erected in Baltimore, varies from 50 to 100 gallons per minute, pumping against a head of from 150 to 200 feet. To take care of this pump will require a motor of 5 to 7.5 horsepower capacity.

TABLE I.

ELEVATORS IN THREE OFFICE BUILDINGS

	Rentable Area Sq. Ft.	No. Floors	No. Elevators	Rentable Area per Elevator	Rentable Area per Elevator per Floor	Dimension Cars	Floor Area Each	Total Floor Area	Sq. Ft. Rentable Area per Sq. Ft. Car Area	Capacity Lbs.	Type	Miles per Day	Car Miles per Day
A	77,920	16	5	15,560	975	5′ 4″ x 6′ 5″	34.6	173	450	2,500	Hydraulic	75	15
B	46,496	10	4	11,600	1,160	4′ 8″ x 5′ 6″	25.6	103	450	2,500	Hydraulic	35	9
C	41,800	10	3	13,950	1,395	5′ 6″ x 5′ 4″	29	87	480	2,000	Hydraulic	29	9.7

TABLE II

LIGHTING IN FIVE OFFICE BUILDINGS

	No. Floors	Office Area Sq. Ft.	Office Area per Floor	Area Illuminated per 16 C. P. Equiva- Sq. Ft.	Avge. Consumption per 1000 Sq. Ft. of Area	Connected K. W. in Light	No. 16 C. P. Equivalent	K. W. of Demand	Avge. Monthly Consumption	Equivalent Hours Use of Connected K. W. per Month
A	16	77,920	4,870	26	140	150	3,000	74.4	11,000	73
B	10	46,396	4,639	30	162	75	1,500	30	7,500	100
C	10	41,800	4,180	32	108	65	1,300	25	4,500	69
D	14	67,000	4,785	33.5	87	100	2,000		5,800	58
E	11	37,667	3,420	37	93	50	1,000		3,500	70

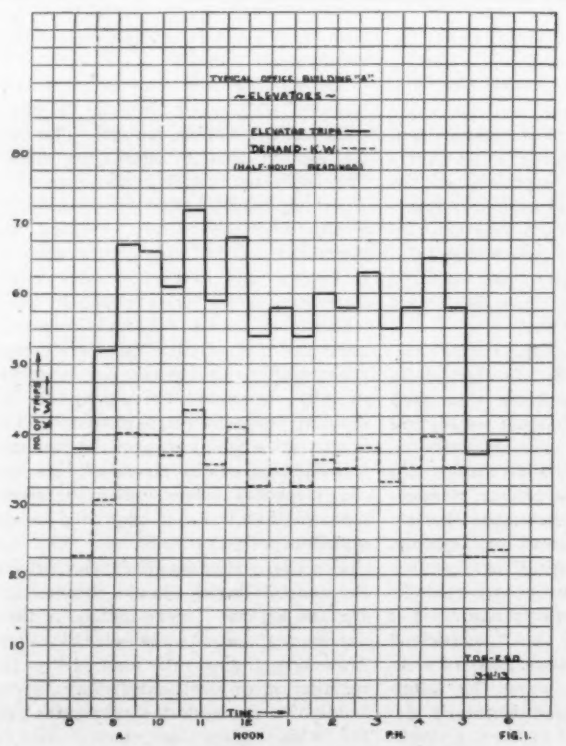


FIG. 1.

Typical Elevator Curve in Office Building.

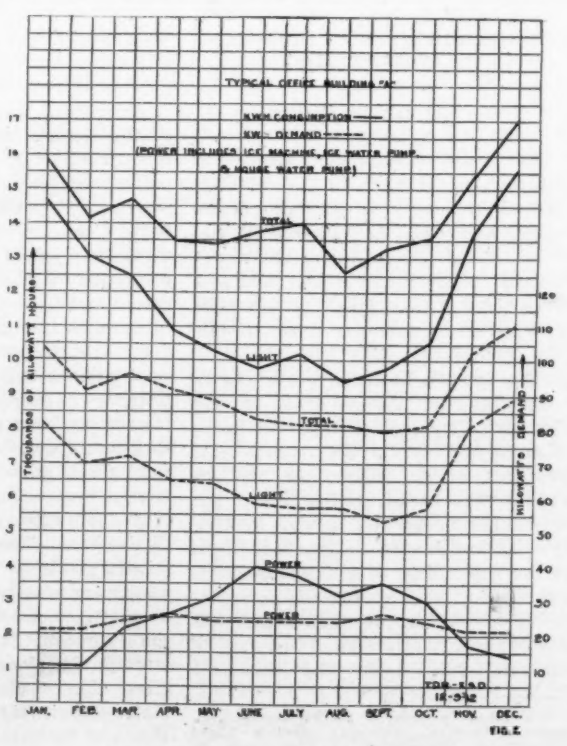


FIG. 2.

Typical Power Curve in Office Building.

In all modern buildings now being erected you will find equipment for cooling and circulating drinking water through the building. The application of electricity to this type of apparatus has been found to offer many advantages. Refrigeration finds its ideal source of power when operated by electricity. The compression machine driven by an electric motor is decidedly better than the absorption machine in every case. Although the latter machine has the advantage of the use of exhaust steam, its disadvantages, when compared with the compression type, entirely outweigh this one advantage. Its first cost is high, it requires large quantities of cooling water, its repairs run high, and finally, it is hard to regulate and manage.

The size of the refrigeration machine used in office buildings varies somewhat in general practice, ranging from 2.5 to 20 tons capacity, and it is rather difficult to arrive at any general rules, except, of course, to figure from the actual amount and the temperature of the water required. For the circulation of the cool water, a small motor-driven pump of either the reciprocating or the centrifugal type is used, of capacities ranging from 50 to 100 gallons per minute. This water is kept circulating all the time from the cooler to the building, additional water being added only as used in the building. The water in the cooler is kept at a certain level by means of a float valve, so that when any is used in the building and does not flow back to the cooler, this loss is supplied through the float valve. The operation of the compression machine, driven by an electric motor, will be found to amount to not over 8 hours operation out of every 36 hours.

The ventilation of office buildings is usually obtained by installing two or three fans at various places in the building; one fan being placed in the upper story and arranged to exhaust the air from the building, and one placed in the basement to draw fresh air to a system of ducts. To allow sufficient air there should be about 2,000 cubic feet per hour for each occupant of the building. To supply this air the fans should be at least 24 inches in diameter, requiring a motor of from 2 horsepower capacity and up.

The use of vacuum cleaning apparatus, whether in small portable units or one large unit located in the basement, is almost indispensable. The use of portable units reduces operating costs, but is not quite so convenient as the other system. When using one large unit in the basement the necessary equipment amounts to a large vacuum pump running at such a speed as to give about a 12-inch vacuum and requiring about a 10-horsepower motor to operate it. The operation of this machine, if care is taken, should not amount to over 8 hours per week.

Taking a general survey of all the applications of electricity in office buildings, we find that, although there is some use for steam in such installations, electricity adapts itself very favorably to such usage, and has proven itself to be not only on a par with any other source of power, but to be far better on cost of operation.

Commercial Practice
Management, Rates, New Business

COMMERCIALIZING ELECTRICAL ADVERTISING[1].

By Norman B. Hickox.

The central station must consider the electric sign solely from the commercial side, prizing it in exact proportion to its money-making capabilities, and it is therefore the desire of the writer to avoid entirely the artistic and aesthetic sides of the subject, dealing with it only from a commercial and profitable standpoint.

As today the business world clearly recognizes the pre-eminence of the illuminated sign, for its additional hours of usefulness and for the psychological efficiency of any lighted or brilliant object, the central station which has determined to increase its sign lighting revenue has already an excellent start, as the superiority of its commodity is established. To convince the prospective customer that the electric sign will add to the attractiveness of his place of business,—will justify the necessary outlay,—will get and hold new customers,—will, in a word, profit him, is a comparatively easy proposition.

There is no question as to the value of the electric sign to its owner, and to the community at large, as an advertising medium. A comparison of the streets of any city with their appearance a few years ago, emphatically attests the public endorsement and appreciation of electricity, not only for use in signs alone but for other forms of out-door illumination.

It is the business of the central station to know every electric sign on its lines, in its city,—to know that each is properly hung and safely wired, and that future signs are of such quality as to require a minimum of attention. No central station, under proper management, will allow or encourage the use of inefficient apparatus for lighting, power, electrical heating, or for that matter, any apparatus constructed by inexpert, so-called "electricians." Yet the "tinsmith" and the "electrician" attempt ridiculous installations of electrical sign displays, using the legitimate electric sign manufacturer's design and lay-out, and producing conditions which are absolutely dangerous, both from an electrical and mechanical standpoint.

Let me ask you, who gets the first "trouble" call, when anything electrical goes wrong? Think it over. The central station does, of course, no matter who sold or installed the apparatus. The impression that "something is wrong with the current" created and imprinted on that customer's memory is lasting, and takes unceasing effort to erase. Who hears about it when leakage of current through unknown grounds or inefficient apparatus, runs the monthly consumption far in excess of what it should be? Why do the building inspection departments of our larger cities rigidly inspect the mechanical hanging of the electrical sign and the electrical inspection departments demand that it be of approved workmanship.

For these reasons, if for no others, the central station should commercialize, and by that I mean include in their commercial work, the electric sign. However, the profits insured by the installation of electrical displays, speak loudly for the adoption of a sales policy which gives the electric sign a place in the front rank.

1 A paper presented before the Southeastern Section, National Electric Light Association Convention at Charleston, S. C., August 19-21.

To be successful in placing the greatest number of electric signs, and to promote a satisfactory campaign for such results, the central station must first be right on existing conditions. What are the characteristics of the signs now in your town? Are they dingy, decrepit, unwashed, unpainted, wholly or partially unlighted? Are they a credit to the owner, to the lighting company, to the municipality? Are they unreasonably large and do they occupy an unreasonable amount of the public thoroughfare? Do they need freshening up, new lamps, adjustment of the flashers? Do they consist of every conceivable variety? Are they level, straight, safe, and will they pass, say, a reasonable electrical inspection? Do you really know just how many of them there are—the total consumption —the demand—the revenue? Do they burn on all kinds of rates, all kinds of ways and times—some one hour a night—others possibly every third or fourth night—and the rest when the owner happens to remember he has an electrical display actually connected up?

What does your city building code say about the size of signs? Are any of the present signs violating the law? Or is the law an unreasonable one? Does it need repealing or amending before you feel that you can proceed with your campaign with any hope for reasonable results?

Most restrictive ordinances were placed on the statute books before the value of electricity and electric signs to the municipality was realized. Others were the outgrowth of continued abuse of what privileges existed allowing signs to project over the sidewalks and streets, the greedy ones placing their signs anywhere and everywhere, extending and enlarging them until, after an unhappy accident of some kind, heated and unfavorable public opinion placed prohibitive ordinances in force.

Continued vigilance on the part of the central station, directed in such a manner as to insure proper inspection by the city officials, and prohibition of all signs which are contrary to law, or if there exists no law, contrary to common-sense judgment, will be of the greatest assistance in placing the maximum of electric signs, with a future ahead that need not be looked forward to with fear and trembling. If the electric sign situation has come into "evil days" in your city, the blame always may be traced, directly or indirectly, to the central station, for electric signs are their signs, in every sense, and if they have allowed the situation to retrograde, it is because of the fact that they were short-sighted as to the future.

Now, to begin the campaign properly, do not begin until you are **ready** to begin. Get right on what you have, muster the soldiers already enlisted,—equip them and yourself for the battle, —list them, —adjust them, —revive them,—drill them,—get them working together, on the same rates, the same burning hours, on the same basis,—in a word, co-operating, with you in your coming fight for more,—get the laws straight and clear,—get, in an electrical sense, 100 per cent efficiency. Don't solicit Jones for an electrical display without making sure that Smith's sign and Brown's sign are right and tight and bright. Don't,—or you won't get far with Jones.

Now,—you have set the rest right,—take a generous dose of your own medicine,—erect a fine, big, dignified, electrical advertising display for yourself, advertising your electrical service, the commodity you have to sell. Let it have colors—and motion—for the electric sign which really places its message deepest into the mind, must have color and motion.

Then comes the consideration of the policy you must adopt in the placing of the additional signs, which must, first of all, conform to conditions already existing as regards electric signs. Write it down clearly,—so that your sales force and your office men can make no mistake. Make this policy as broad as you can, for the broader policy adopted, the more results will be achieved.

For your assistance in determining the policy which will bring about the most satisfactory results, I will outline five methods which are found, with variations, in more or less common use throughout the country,—some of them, unfortunately, to the discredit of our industry.

The first is the central station which fails to recognize the very existence of the electric sign—I relegate him herewith to the rear—where all back numbers belong.

The second central station pursues a policy of lackadaisical effort to induce every electric sign manufacturer of any size and of whatever character to solicit, at their sole expense, the entire personnel of the local prospect list, (if there happens to be even a list), and delights in the competitive fight which occurs over each sale made, which is always finally accomplished by such butchering of price that the quality of the signs supplied must be very poor. This means nothing but trouble for the central station in the near future. When the manufacturer's salesman calls, this manager, without removing his feet from the desk, often says, "The whole town's your prospect" and with this sort of co-operation expects wonderful results, and is really surprised when he does not get them.

The third class includes central stations with their commercial departments in charge of a personage who is over-zealous to the extent of seeing to it that his customers buy the sign they have decided upon, (after picking to pieces fourteen designs from as many manufacturers), from the manufacturer who will construct that particular design the cheapest, whether or no it may be his own design. This business-getter believes it a feather in his cap to put over such deals, and in turning his back while the design is misapplied, thinks he is doing his duty. Sooner or later the reputable manufacturer finds him out, and he is very often somewhat "jarred" after being told of his destructive work. Many electric sign sales have been lost, and many possible users discouraged, by the presentation of more than one proposition at a time, such action tending to confuse the customer rather than to assist the sale.

Fourth comes the central station with a well organized sales department, whose members accompany and assist the salesmen of the various reputable manufacturers, but whose company does not handle the sign account, or give any further assistance in erecting and maintaining the displays.

The fifth and most satisfactory method, is adopted by those central stations of broad policy, who will be found, upon investigation, to have made a success of the electric sign sales work. These central stations handle the sign accounts for customers of good credit standing, spreading the cost of the sign, erection, and maintenance over a period of months, and recommending only the best makes of signs. This policy, once adopted, crystallizes into such form that the operating company gauges and picks what it considers to be the best organization to handle the situation of selling and manufacturing the signs, and co-operates with that particular manufacturer, exclusively, squarely, honestly and fairly, co-operating, too, with the interest of both at heart, and not calling on the manufacturer to do more than his share of the promotion and sales work. The terms under which signs are placed are made reasonable as possible. This policy always succeeds in placing more electrical displays for the amount of effort put forth, than does any other.

The most vital point in this last method, and in reality the most vital point in the entire work of commercializing the electric sign, is to find the manufacturer who is equipped to give you the proper service and co-operation. By service, I mean the best designs, the best signs, and the best co-

operation in selling them, besides which there must be the organization for producing for the customer just what has been sold him. When you do find such a manufacturer, stay by him and work with him so long as he gives you satisfaction. Give him a chance to design and re-design for every prospect, but don't call on him to design for those who you do not **know** are interested. One of the greatest injustices done the present day sign manufacturer is for the embryonic "new-business man" to go down one side of the street and up the other, listing every merchant and calling for a design before making sure that he will even look at it.

Let me pause here to say that one big sign company, which furnishes thousands of designs and propositions, has found, through actual experience, that the average cost of each design is one dollar and ten cents for labor alone, not to speak of the office work in figuring and writing up propositions, postage, stationery, etc., nor including anything to represent the value of having an organization perfected which has the ability to execute such a design.

Do not hamper the manufacturer by bringing in competition, with prices and specifications on an article which is bound to be somewhat different than what he is selling and producing. There are no two electric signs manufacturers in the United States today making an equivalent product—each has his own methods—find the best, for there is a "best." In these advanced days of efficiency, those at the front are not those who return as small values as possible for your dollar, but those who attempt to give all possible for what they receive, in service, and in product,—somewhere near a dollar's worth for each dollar—in value more than a dollar's worth so far as the purchaser is concerned. Who today, desires anything but the best? Are you not surrounded by what you believe to be best, and by what you have found to be best by actual test?—your employees, your machinery, your apparatus, your service, even your very mode of living?

Modern commerce is of the best—all strive for the best—to be the best—everyone adopts the best—because the world has awakened to the fact that the best is always the cheapest.

Again, you are doing a great injustice, and not a favor, to your prospective customer, when you present him with more than one design and set of specifications at a time, because the most simple of them present a matter to him, regarding which, in the majority of cases, he has only a passing knowledge. The sale is never facilitated, but many times delayed, and often lost entirely.

How many of you hold more than one motor contract? Why do you recommend and encourage your customers to use some certain make of motors? Because you have found it to the best advantage, no doubt, and also because the motor manufacturer insists on you holding only the one contract. Yet his representatives do not spend nearly the time, effort, and money to help you connect motor business, as do those of the electric sign manufacturer. As it is with the motor manufacturer, so it is with the sign man, if you confine your purchases and efforts to one line, you will receive more service, better service, and sell more signs, than if your sales force is working with ten manufacturers all at the same time. So far as product is concerned, signs are the same as other standard devices—the good ones, the honest ones, those which give satisfaction, will not vary in price, for the reason that just so much material and labor of certain grades are necessary to properly produce the same grade of product.

Now let us consider a method by which signs may be quickly, efficiently, and profitably placed. While there are many methods in use, time prevents the explanation of more than one, which, with slight variations, is used by many successful companies.

The cost of the sign from the manufacturer is taken as a basis, and to this figure is added the estimated amounts for freight, drayage, mechanical erection, wiring, low-voltage transformer, (if used), first installation of lamps, estimated cost of renewals covering the contract period, a small charge for patroling, and interest covering the contract period. This total is then divided by the number of months that contract is to run, giving a fixed sum per month that customer will pay on the installation. Experience has proven that a figure of ten cents per lamp per month, on a basis of three years, or twelve and one-half cents per lamp per month, on a basis of two years, will more than cover the average installations, and that at the above figures, a profit will be shown at the end of any year, on that year's installations.

The revenue desired per kilowatt-hour is then fixed, which it might be stated in passing, averages very close to six cents in the entire United States, and the hours of lighting, or what is termed the lighting schedule, determined.

In our section, an 11 o'clock schedule seems to cover the average requirements, and it is estimated that such a schedule totals 2,008 burning hours per year, figuring from 5:30 p. m. until 11 p. m. each and every night. In round numbers, and using five-watt lamps as a basis, with no allowance for flashing periods, eight and one-third cents per lamp per month will produce a revenue of ten cents per kilowatt-hour,—seven and one-half cents brings nine cents per kilowatt-hour,—six and two-thirds cents brings eight cents per kilowatt-hour,—five and three-quarter cents brings seven cents per kilowatt-hour and five cents brings six cents per kilowatt-hour. It can, therefore, be readily determined that a rate of fifteen cents per lamp per month, on a three-year contract, will cover the installation complete, on an eleven o'clock schedule, and that the end of the period, the central station will have enjoyed a gross income of say, $903.60, representing the sale of 15,060 kilowatt-hours at six cents per kilowatt-hour. The investment will have been taken care of, with interest, and the customer will be possessor of an electrical advertising display, which after having continued its use for three years, cannot be dispensed with.

And yet, we still find those who declare electric signs are unprofitable. True enough, a man once stood on Broadway and failed to sell golden dollars for five cents each.

By establishing a straight rate per lamp per month, the maximum results may be achieved, as the cost of any sign display may be quickly computed in terms which will be readily understood by every prospect, and in such a manner as will be clearly fixed in mind. An ideal situation is created by the simple fact that every sign is on an equivalent basis.

The characteristics of the sign load, are varied, and on account of lack of time will not be discussed in detail, other than to emphasize the fact that the sign load is a valuable one, and where the displays are maintained on flat-rate service, somewhat as above outlined, with all signs operating as a unit, it may be readily and intelligently considered by the central station as an operating factor. Some cities have their flat-rate signs supplied by what is known as their "sign network" fed from the switchboard and operated from that point. With a separate meter on the "sign" panel, the amount of revenue and kilowatt-hour output can be figured to a nicety and the load handled from one generating unit to another, without any disturbance of other classes of service.

"The High Cost of Working," says the Topeka Edison Company in a display, "is well exemplified by the woman who turns the washing machine herself all morning to save five cents worth of electric current."

Foreign Population Reached in New York.

The accompanying illustration shows 14 varieties of "foreign language" advertisements issued by the New York Edison Company, in various New York daily and weekly papers, in an effort to acquaint Gotham's heterogeneous population with the advantages of central-station electric service.

New York is indeed the melting pot of America and this foreign-language advertising campaign organized by the Edison company is one of the many factors that work toward molding these foreigners into progressive American citizens. New customers among the city's foreign residents are looked for just as eagerly as customers among the Americans, and to this end the lighting company makes special advertising appropriation for foreign papers. The three German papers in New York are not included in the list of foreign dailies, but are rated with the American dailies and given the same amount of advertising copy each week. The list of foreign language papers includes 27, divided among 13 different nationalities.

In this way nearly one million foreigners, or to be exact, 925,600 foreigners or foreign families are reached in Greater New York, for that is the combined circulation figures of the 27 journals. In addition to this the German dailies reach 227,000 readers.

Ярко-освѣщенные магазины привлекаютъ покупателей
Jasné obchody přitahují kostýmov.
Jasny Sklep Pociąga Gości
Светли дућани привлаче муштерије
SVIJETLI DUĆANI PRIVLAČUJU MUŠTERIJE

Samples of Foreign Advertising by the New York Edison Company.

Electric Kitchen Equipment Campaign in Kansas City.

Louis F. Egan, manager of the Kansas City Electric Light Company, has been impressing on the women of Kansas City, Mo., this summer the economy and comfort of electrical equipment in the kitchens. The company's advertising has been aimed at the women, with pictures of women laboring over hot stoves, or comfortably using electric irons; and the slogan has been, "Kitchen equipment for $12, a dollar down and a dollar a month." The suggestion is made that the husband can easily pay that small sum for the preservation of the health of his wife. There has been large response to the plan. An especially favorable result has been that many of the new customers, after they have decided on the kitchen equipment, decide that they might as well have the whole house wired at once. The offer of the company was that the kitchen would be wired, a two-outlet wall bracket, one 60-watt lamp and an electric flatiron provided, for the sum of $12.

Efficient Trouble Department.

"If your electric toaster goes bad at the breakfast table, telephone the trouble department, and an expert will hurry to your relief on a motorcycle so promptly as to cause only slight delay in the meal." This, in almost exact words, is what the Columbus Railway, Power & Light Company, Columbus, O., is telling its patrons. The management knows of no other trouble department in the country that is as near perfection. It is maintained on a 24-hour schedule, seven days in a week, with motorcycle squads of electricians at any time of the day or night.

In making the department apply to appliances as well as to wire difficulties and the repairing of connections and fuses, the company has inaugurated an original service. It is free to all consumers of current, regardless of where the appliance may have been purchased, except in case where new parts have to be supplied.

Unique Demonstration of Washing Machine.

During the last three August discount days the new-business department of the Menominee & Marinette Light and Traction Company conducted a very satisfactory washing-machine demonstration at its Marinette office, which resulted in a number of sales and a large number of prospects.

WEDNESDAY AND THURSDAY
are
LADIES'DAYS
at our office. We have a treat in store for all the ladies of Menominee, and now cordially invite them to attend our Electric Washing Demonstration on the above days. So make no other appointments for Wednesday and Thursday.
Mr. Purvis, factory representative of the famous "SAFETY FIRST" Thor Electric Washing Machine, will be in charge of the demonstration, who will gladly give you all the information you may desire. Meet your friends here. The visit will no doubt prove very profitable to you.
Trolley Ride Tonight
Light & Traction Co.
New Business Dept.

Newspaper Advertisement Used in Menominee Campaign.

After completing the Marinette demonstration it was decided that a similar one should be held at the Menominee (Mich.) office. As the discount days were over, it was a question whether enough people could be attracted to the office, hence, the company decided it would be a wise and a very unique plan to do public washing outside of the office, where there is an ideal pavement frontage. J. H. Peterson, new-business manager of the company, contributes the following account of the campaign: The next move was to stretch a clothes line between the two ornamental posts in front of our office, secure a clothes basket, ironing board, clothes drying rack, etc., to complete the setting. In an hour's time we had a complete fam-

ily wash out on the line, which proved to be the talk of the town during our three days' demonstration. As evidence of this fact, we received a column feature story on the front page of our local paper in spite of the war news.

One phase of this demonstration that proved interesting to the public was the fact that we illustrated the cost of operating the washing machine and wringer by means of the Donkin cent-hour meter. We would often ask the spectators which they considered the most expensive to operate, the machine or the flat iron, and invariably they replied the machine. Here the cent-hour meter surprised them and did its share to popularize electric washing.

One of the most interesting sales during this campaign was that of a machine to one of our local barber shops. This particular shop has been paying a flat rate of $10 per month for shop laundry. After some argument and sales talk, the proprietor was convinced that he could save between $6.00 and $7.00 per month by installing an electric washer and electric iron, and doing his own laundry the electric way.

Today this proprietor features his place of business as the "Sanitary Shop," and advertises the fact that he does his own laundry work. The arrangements of the washer and ironing board are such that the customers can see the machine in operation. (This we consider mighty good publicity for all concerned.)

The above demonstrations were in direct charge of George R. Purvis, factory representative of the Hurley Machine Company. The new Thor No. 25 was used and featured as the "Safety First" machine. Several actual demonstrations were given in various homes, and each demonstration resulted in a sale.

We believe that Menominee now has the reputation of having the first outdoor electric washing machine demonstration in this country, and if we haven't we are satisfied that it is one good way to sell and popularize the electric washing machine.

The following is taken from the newspaper account of the campaign, appearing in the local papers.

For the first time in the history of the city and also in the annals of the light and traction company, there is a washout on one of the main street lines in Menominee. And it happened without the necessary downpour of rain which is always responsible for washouts on rail lines.

The "washout" is directly in front of the traction company's office on Main Street and although it has been there since yesterday officials of the company stated this morning that it will not be overcome until Saturday evening. Meanwhile traffic in front of the building is being impaired more or less by pedestrians who are curious about the washout.

Here is what they find. A real live washing machine is chiefly responsible for the impediment in traffic. The machine is being demonstrated by George W. Purvis of St. Louis, and the washout which is attracting attention is a washing of such snowy whiteness that the women who have seen it are envious of the machine's ability to turn out so clean a job. The local company has the agency for the new machine and this is the first time that it has been demonstrated out of doors in any city. The plan is unique in that clothes are brought to the machine by different people of the city who are anxious to test its work. The washing is done before their eyes by the machine, which washes and wrings by electricity. When the clothes are washed they are hung on the clothesline on the street.

Central-Station Float in Civic Parade.

The float shown herewith participated in the "Potlatch" parades held in Seattle, Wash., July 15 to 18. The occasion was the annual "Dad's Day" procession, and the float was donated by the Puget Sound Traction, Light & Power Company.

The left half of the picture shows Dad, the household drudge, attending to his multifarious duties before electricity, the practical housekeeper, came to his assistance. The right half of the photograph shows the washing machine, the electric irons, the electric range and other household essentials operating without human assistance while "Dad" reclines in ease. Electricity was his salvation.

Central-Station Float in Civic Parade.

This float brought forth much favorable comment and brought electrical household devices before the public in such a way that much good resulted.

Cincinnati Rate Regulation Deferred.

The City Council of Cincinnati, O., has passed an ordinance extending for three months from September 1, the contract agreement with the Union Gas & Electric Company regulating the rates to be charged for current in the city. It is estimated that the city will not be in a position to fix new rates intelligently until the valuation now going on is completed.

Convincing Window Display.

In the window of the Kansas City Electric Light company recently, coincident with the arrival of mosquitoes, was a pleasant and very suggestive scene. A baby's crib, and baby asleep, peaceful, sweet and secure—because blowing across the baby's form and face was a cool breeze from an electric fan. The legend on the display card met the situation of many Kansas Cityans at that exact moment very aptly: "Mosquitoes can't land in the current of an electric fan at second speed.

"Cost per night is two cents."

Electric Sign Data

Recent Electric Sign Installations.

Speaking before a convention of central-station men of the South recently, Norman B. Hickox of the Greenwood Advertising Company, said, "Let me thoroughly impress upon you, that in selling your prospect an electric sign, you are selling him a distinct service—an advertising service—which will become so valuable to him that he will never be willing to relinquish the use of the electrical display in the future, especially when he receives the service as he should receive it, properly, perfectly and constantly. This may be accomplished by granting the electric sign its proper position as an electrical revenue producer, and as a standing, although silent message to 'Do It Electrically.'"

What is claimed as the largest electric roof sign in the world is installed in Montreal, Can., for the Ontario Furniture Company, on the roof of the company's nine-story reinforced-concrete building. The sign measures 135 feet by 77 feet and weighs practically 33 tons. About 6,000 five-watt lamps are used. The sign was designed and built by the Denis Advertising Signs, Ltd., Montreal, P. Q. The flasher equipment was provided by the National Electric Sign Company, Jersey City, N. J. Energy amounting to approximately 2,500 kilowatt-hours per month is supplied by the Montreal Light, Heat & Power Company.

W. L. Milner & Company, one of the largest department stores in Toledo, O., has secured permission to erect a large electric sign at Jefferson Avenue and Summit Street to be used during a 30-days' special sale. The sign will be 28 feet long and 6 feet wide. The lights will outline the figure of Mr. Lockhart, who conducts the annual Lockhart mill-end sales for the company.

The Louisville (Ky.) branch of the Federal Sign System (Electric), of which R. E. Brian is manager, is installing a roof sign on the National Theater building at Fifth and Walnut Streets, Louisville, in place of the National Theater sign which has occupied the same location. The B. F. Keith interests have taken over the National Theater and the roof sign will indicate this fact with "B. F. Keith" in seven-foot skeleton letters and "Vaudeville" in five-foot letters, all to be surrounded by an attractive, moving, colored border with a revolving sphere at the top.

The Federal office also is installing the largest sidewalk sign in Lexington, Ky., in front of the Ada Meade Theater of the Gurnee Amusement Company. The sign will be double faced, 4 by 13 feet, of embossed, porcelain-enameled steel and the sectional letters will read: "Ada Meade Vaudeville,."

It is within the last few years that electricity has been applied to the barber pole. The electrical revolving barber pole has for a middle section a glass cylinder that is two feet or more in diameter, this section being supported on an ornamental base or on a stout brass rod rising from the sidewalk. The glass section of the pole is surmounted by an ornamental cap.

Within the glass section of the pole is another cylinder made of a thin, lightweight, translucent material, upon which are painted the traditional spiral stripes of red, white and blue, the familiar sign of the barber. This inner cylinder is pivoted top and bottom and made to revolve by means of a tiny electric motor attached at the top. Current is carried to this motor on a wire leading from an electric fixture within the building and up out of sight inside the poles' base. Within the inner cylinder of the electric revolving barber pole are two incandescent electric lights by which the pole can be illuminated at night.

The electric barber pole, without a base support is also, made in the form of a bracket pole which can be attached to the front of a building.

One of the smallest electric slogan signs has been erected in Salisbury, N. C., under the auspices of the local Industrial Club. The sign measures 19 feet high by 34 feet long and contains 340 lamps.

Sign sketch contributed by the Greenwood Advertising Company, Knoxville, Tenn., of sign recently constructed by this company.

Size of sign is 15 feet by 18.5 feet. Sign is double faced using a total of 364 five-watt lamps. Letters are 16-inch of raised spur block type.

Lightning stroke is arranged to flash across sign alternately with flashing on of wording.

Background is imported glass smalt.

Electrical Construction

WIRING DETAILS OF TAYLOR SONS & COMPANY'S STORE.

Details of Additional Wiring Required for Alterations Made.

Taylor Sons & Company's department store, Cleveland, O., has recently been enlarged by the addition of four stories. It was hence necessary to so modify the electrical installation of the building as to supply lighting and telephone energy to the four new floors. The contract for the work involved was awarded to the Vedder Electric Company, Cleveland, O.

These alterations necessitated the installation of a six-panel switchboard. This switchboard, which is shown in Fig. 1, is located in the basement of the building. It is of marble, rests on a concrete base and is supported four feet from the wall by means of an angle-iron frame. Energy is obtained from the 110-200-volt three-wire mains of the Cleveland Electric Illuminating Company on Euclid Avenue, three 2,000,000-circular-mil cables being used for carrying the current for lighting and two 2,000,000-circular-mil cables being used to supply 220-volt energy for power purposes. These conductors as well as all conductors throughout the building, are carried in Galvaduct conduit.

One interesting feature of this board is the method of carrying the various cables to it. As previously stated, conduit is used throughout. Where these conduit runs terminate to the rear of the board Crouse-Hinds porcelain condulets are employed throughout in place of the conduit bushings generally used for the purpose. To the rear of the board are mounted link fuses on special narrow panels for protecting the service feeders.

As can be seen from the illustration, the left panel contains four General Electric recording watt-hour meters. Three of these are used to record the energy used for lighting purposes and one is used to record the energy used for power applications. Weston voltmeters and ammeters are employed throughout. On one of the middle panels is located the ground detector.

It will be noticed that the service switches which are located on the left panel are of the double-throw type. This arrangement is employed so that three-wire lighting energy at 110 volts may be obtained from the 220-volt direct-current power circuit when necessary. The middle wire of the three-wire service, from which the 220-volt energy is obtained, is grounded, thus rendering the connections indicated possible by the grounding of the neutral wire of the three-wire system.

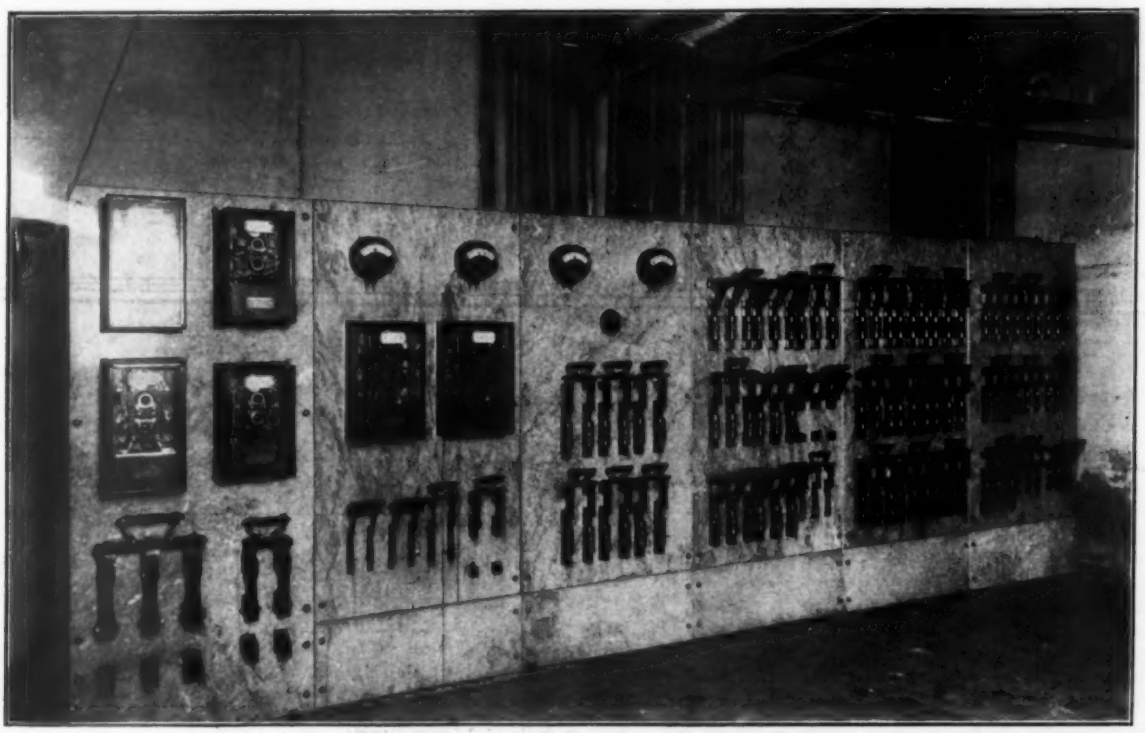


Fig. 1.—View of Main Switchboard.

All of the conduit runs in the basement of the building are exposed. In the switchboard room, where numerous conduits are necessarily carried on the ceiling, they are supported by the usual transverse pipe hung on strips of strap iron. For individual runs of conduits U-straps are employed.

Distribution Circuits.

From the switchboard one set of

lighting risers is run to each of the four new floors. As it was, of course, necessary to install all new wiring in such a way as to require very little alteration in the existing equipment, it was decided to carry these risers up the elevator shaft, thus avoiding the necessity for tearing up any part of the old building for the installation of the new conduits. Pull boxes are employed where the conduits enter and leave the shaft.

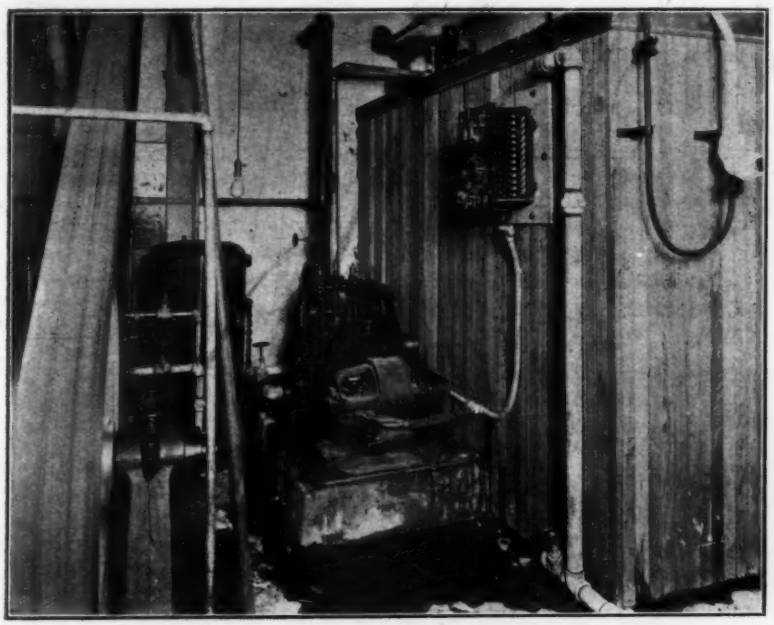


Fig. 2.—Motor-Driven Water Pump.

The power cables supplying the motors for the eight Otis passenger elevators and the two Otis freight elevators are also carried from the main switchboard to the pent house in conduit installed in the elevator shaft.

The exit lights throughout the buildings are all on a separate circuit which is controlled directly from the main switchboard in the basement.

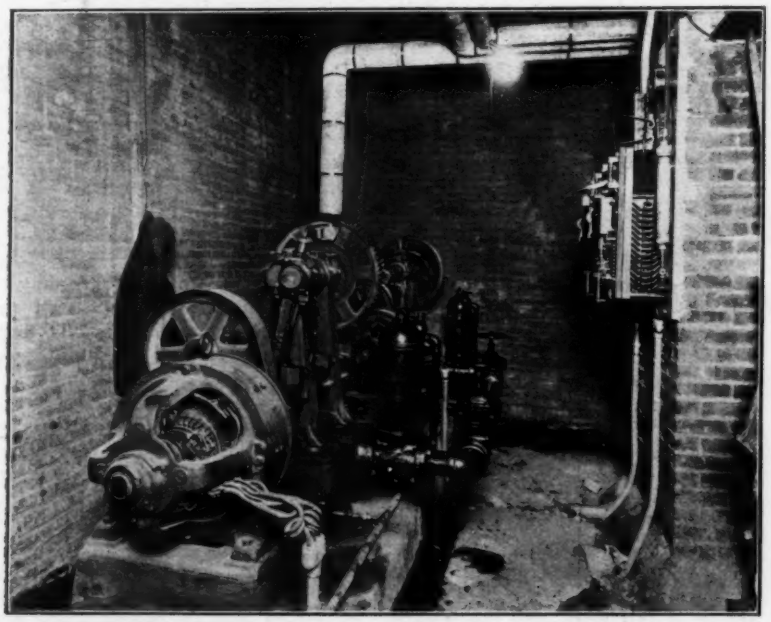


Fig. 3—Motor-Driven Ventilating Apparatus with Automatic Control.

Each of the four additional floors has about 200 circuits which supply the ceiling lights and the column receptacles provided for the reception of attachment plugs attached to counter show-case lamps and to such portable lamps as may be desired at various times. Each lighting outlet is supplied from a separate circuit which is controlled from a separate switch in one of the floor cabinets. Each floor is equipped with seven cabinets for the control of such circuits. Holophane reflectors are used for the ceiling lights on all floors except the mezzanine floor, where Monolux globes are employed.

The building is also equipped with an extensive telephone system. Numerous telephone sets can be installed on the various floors. For this purpose the telephone conduits are run to the base of the columns on the floors where the connections to the instruments are made.

Power Applications.

A number of motors are installed in the basement, all of them being of the 220-volt direct-current type. Fig. 2 shows a view of a 10-horsepower motor driving the water pump which delivers the pressure necessary to supply water to all floors of the building. It will be noticed that this motor is controlled by a controller mounted on a wood partition near it. A somewhat usual feature of this arrangement is that the conduit leading to the starting box also carries the wires leading from the starting box to the motor, the motor wires leaving the conduit near the motor through a Crouse-Hinds porcelain Obround Condulet fitting.

Fig. 3 shows a view of the motor-driven ventilating equipment. The two motors for this equipment are controlled from the automatic Cutler-Hammer control panel installed on the brick column. This controller is pressure-controlled and is automatic in its operation. The conduits from this control panel are carried under the concrete floor, through the concrete machine base to the two motors where condulets are employed for conducting the wires out of the conduits.

Among the other motors in the basement are a 25-horsepower motor driving an ammonia pump and a 15-horsepower motor driving a water pump. Both of these motors are controlled from a nearby asphaltum-painted wooden control board on which the two motor starters are mounted together with the necessary switches.

Gas-Driven Generating Plant.

The Monongahela Valley Traction Company has awarded a contract for the installation of machinery and equipment in its $300,000 power house to be erected at Hutchinson, W. Va., which includes four 250-kilowatt gas engines.

Massachusetts Contractors Meet and Arrange for Annual Convention.

A special meeting of the Electrical Contractors' Association of Massachusetts was held in Boston at the City Club on August 19, 1914. At 6 o'clock a dinner was served to members and guests.

The business meeting was called at 7 p. m. by President Gibb, who, after making a few remarks regarding the calling of this meeting, introduced Mr. Hixon, Massachusetts director of the National Electrical Contractors' Association, who gave a resume of the work done at the national convention held in Detroit last month. At the close of his remarks, Mr. Hill, the special representative of the National Electrical Contractors' Association, made an address to the members and outlined just what his position was and just what he was endeavoring to do along the line of benefits for the electrical contractor. Both the addresses of Messrs. Hixon and Hill were received with a great deal of attention and were appreciated very much by the members present.

Starting in on the business of the meeting, Mr. Barnes made a motion, amended by Mr. Coghlin, that the dues and fees be suspended until December 1, 1914, and that a committee of three be appointed to solicit membership, bearing in mind that it was the wish of the Association that all Massachusetts members of the National Association at present not members of the State Association should become members of the latter after this suspended ruling. The committee appointed consisted of Mr. Barnes, chairman, Mr. Holder and Mr. Coghlin.

A resolution was presented by Secretary H. D. Temple and after some debate adopted. It provides for a change of date of the annual meeting from the first Wednesday in December to the first day of October in 1914. The meeting will be held in the form of a three-day convention at Springfield, Mass., beginning October 1. A cordial invitation was extended to, first, all members of the National Electrical Contractors' Association in the New England States to be present on all three days, and second, all electrical contractors of the New England States to be present on October 2 and 3. The regular annual business meeting of the Massachusetts State Association will be held on the first day; on the second and third days, there will be open sessions.

Mr. Andrews made a motion that a committee of five be appointed to carry out the intent of the resolution presented by Mr. Temple, and to proceed to make all needed arrangements for the convention along the lines deemed best, subject to the approval of the Board of Directors. A general discussion took place by Messrs. Hixon, Barnes, Coghlin and Clark. The motion was seconded by Mr. Barnes, after which it was unanimously adopted. The following committee was appointed by the president: Mr. Tuohey, chairman; Messrs. Kimball, Hixon, Andrews and Temple.

Just before the close of the meeting Mr. Lee, of the Cooperative Developing Association, made a few remarks to the Association, and after the members had listened to three anecdotes by Mr. Hill, the meeting adjourned.

Safety Rules for the Operation and Maintenance of Electrical Supply Utilities and Handling Electrical Equipment.

The study of life and property hazards incident to the generation, distribution and use of electrical energy includes the consideration of both construction methods and operating practice. Analysis of the available data on electrical accidents demonstrates their preventability in very large proportion by use of definite operating precautions. This is especially true with those accidents occurring to workmen engaged in electrical work.

Rules for construction, installation and maintenance of electrical equipment to safeguard employees and the public are now under preparation by the Bureau of Standards. The rules for safety in the operation and handling of electrical lines and equipment have been completed and issued as Circular No. 49. They result from a painstaking study by the engineers of the Bureau of exisitng rules and practices. These are found to vary widely and to offer a very unsatisfactory basis for the formulation of mandatory codes by any state commission, unless a very extended study is made and the combined experience of many companies and workmen utilized. Many existing sets of rules have been developed from insufficient data and experience, while the vast majority of companies have no rules whatever in effect. This lack of rules in force is partly due to inaction on the part of state authorities and partly to the difficulty and expense each company encounters in preparing its own rules in any adequate form. The assistance of state commissions, operating companies and electrical workmen has been freely given to the Bureau in this work, and the rules in their present form are offered to the public for criticism, discussion and so far as may be found desirable, for general adoption.

The scope of the safety rules includes all operation of and work on or about, power and signal lines, and the electrical equipment of central stations, substations, mines and testing departments. The rules are divided into three parts. The first two parts consist of general rules which apply to the employer and to the employee respectively, and the third part comprises, under separate headings, those special rules which apply particularly to employees engaged in special classes of electrical work.

It is intended that employees should thoroughly familiarize themselves with all the general rules as well as those which relate solely to their own particular work.

While all the rules find application in the larger industrial or private plants or to utilities of moderate size, some do not apply or apply less fully to the smaller organizations. It has seemed unwise to attempt to restrict the rules to those which are entirely applicable to the smallest organizations or to the simplest classes of electrical work, since the number of workers so employed is small compared with the total number to whose work uniform rules should apply.

The individual rules suggested by conferees and resulting from careful comparisons and selections have been subjected to careful general scrutiny to determine the necessity for each and its general applicability under varying conditions of operation. The different classes or workers to which the rules apply have been freely consulted. Concreteness, simplicity and directness have been sought in the formulation of the rules.

After carefully considering each rule and retaining only those essential to the safety of operation, the grouping was made such as to facilitate reference.

The section for employers calls for providing employees with rules, diagrams and emergency instructions, their assignment to work according to their demonstrated abilities, and the division of responsibility among them in a definite manner so that danger may not arise through conflict on points of authority. The employer is also required to supply portable safeguards, to enforce general operating precautions and to supply employees with forms for the adequate reporting of accidents. The final requirement is that the rules for employees be strictly enforced.

Rules for employees in general are subdivided into six groups. The first enumerates those general precautions the necessity for which seems obvious, but the non-compliance with which is nevertheless responsible for many injuries. The second presents general operating rules, defining the duties and relations of those employees who di-

rect others and the operating methods by which safety is acquired. The third group prescribes the precautions for handling live parts under varying conditions of voltage and location. The fourth and fifth deal with the procedures for assuring the continued safety of work about normally live or moving parts, respectively, by avoiding all possible sources of misunderstanding in killing parts. The sixth group covers in some detail the procedure for making protective grounds and short-circuits.

Special rules for employees comprise nine separate headings, covering the special hazards of work about electrical equipment in stations, at switchboards, about overhead lines, in arc-lamp attendance, on underground lines, meter setting, testing, and in tunnel or mine work. Each class of worker is directed to familiarize himself also with the preceding general rules which apply to all classes of electrical employment.

In a carefully prepared appendix the value of organized accident-prevention work through safety committees is emphasized as a means for reinforcing the effectiveness of safety rules. The report on this subject by the Accident Prevention Committee of the National Electric Light Association is briefly abstracted, and citations are made from the reported organizations and methods of several large and small electrical utilities.

The comment of those commissions, companies and workmen whose study of the subject has been very favorable to the arrangement and substance of the rules given in this edition, and many have expressed a desire to adopt them or to utilize them in preparing similar codes. The requirements of different states and communities should be closely harmonized to secure the best results in reducing the accident toll of electrical service, and the results presented in this code should be advantageous in securing uniformity among the state codes of safety rules.

Great advantage will result to companies and workmen alike by the general adoption by the several states of a single standard set of safety rules, which can be revised in accordance with the progress of the art and the combined experience of all the companies and commissions of the country. Thus will every state and every company secure the advantage of the experience of all.

Where particular rules do not apply their omission will of course cause no conflict in practice. If it is necessary for any state commission to adopt additional rules, that could be done at any time by special orders. This would be easier and less confusing than to have a different set of rules for each separate state.

It is believed that a material reduction in present life hazards to electrical workers may be realized by the general adoption and use of these rules.

CONSTRUCTION FEATURES OF CLEVELAND RAILWAY SHOPS.

A Short Description of the Electrical Work Involved.

The Newburgh shops of the Cleveland (O.) Street Railway Company are of modern structural-steel, brick and concrete construction being fire-proof throughout. These shops include eight buildings, namely, a paint shop, an erection shop, a woodturning shop, a repair shop, a blacksmith shop, a powerhouse, a garage and an office.

Power will be generated in the power house at 500 volts direct current for the trolley system and a 220 volts alternating current for lighting service. Each shop will be supplied with alternating current for lighting purposes and with 500-volt power current through individual feeders. All of these feeders will be carried underground, lead-covered cables being used for the purpose.

Interior View of Paint Shop—Cleveland Railway Shops.

The lamps in the various buildings, however, will not be of the 220-volt type but of the 110-volt type. The 110-volt energy for the lights will be obtained from the 220-volt alternating-current system by means of compensation coils located at the various lighting cabinets. Two of these coils will be connected in series across the 220-volt mains at each cabinet for this purpose. To the outside terminals of these coils and to the junction of the two, wires will be attached, thus giving a 110-220-volt three-wire lighting system. In general 60 and 100-watt

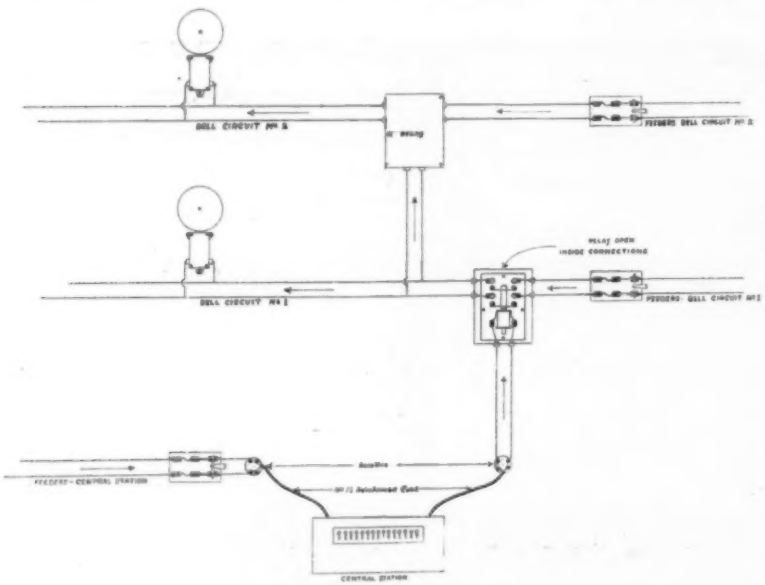
lamps will be employed for lighting the various shops. These will all be of the pendent type, the cords being provided with cord adjusters. Abolite shades will be used throughout the shops for these lamps.

In the yards the lamps will be of the 500-volt type and will be supported at the ends of 2.5-foot cast-iron brackets.

One of the illustrations shows a view of the paint shop which is simiilar in construction to the various other shops. This view shows approximately one half of the total width of the shops. This shop will have two lighting cabinets located along the side of the room. The illustration shows the conduits for the half of the building shown carried down one of the side walls on which a cabinet will be located. *U*-straps are used to support the conduits to the boards nailed to the brick wall. As the ceiling is composed of concrete slats resting on the steel building trusses different means had to be employed on the ceiling for holding the conduit.

A three-eighth-inch star drill was used to form three-eighth-inch holes, 1.25 inches in depth. In these holes three-eighth-inch lead shields were inserted after which the 1.25-inch screws supporting Bissel Company's Security pipe clamps holding the conduits were inserted. All conduit is being bent on the job by means of a hickey. The type of conduit being employed on this job is the Safety Armorite Conduit Company's Armorduct.

Another illustration shows the Mead Electric Company's Tele-Call system which is being installed in these shops. This system is used to call persons to the nearest telephone instrument. At the telephone operators desk a series of special switches are located, the switches controlling the movement of a special motor-driven cam contact-making device which will cause all bells to ring a certain number of times depending upon which switch is operated. A repeating lever not shown on the diagram is used for repeating the signals. Energy at 110 volts is supplied to the central station from which wires from the contact-making device are run as shown in the figure to a relay. When current flows in the wires leading to the relay, the contact disks move upwards causing contact to be made between the set of 110-volt feeders marked "Feeders Bell Circuit No. 1 and bell circuit No. 1." Bell No. 1 will hence ring and as a second relay is connected across the wires con-



Circuits for Tele-Call System.

stituting the circuits for bell No. 1, this relay will operate and close the feeding circuit for bell No. 2. Any number of relays may be connected to circuit No. 1, the number, however, being limited by the requirement of the National Electrical Code, prohibiting more than 600 watts on such a circuit, Class C rules.

The system installed will have 25 signal bells and form relays. It can easily be seen from the diagram that more than one bell can easily be connected to any of the relay circuits. All circuits will be installed in conduit and the signal bells will be distributed among the various buildings.

The Vedder Electric Company, Cleveland, O., has the contract for all the electrical work.

Alexander Electric Company, formerly located at 613 Sprague Avenue, Spokane, Wash., has been forced to seek larger quarters at 106 South Howard Street, Spokane. This company does a contracting business.

MINIMIZING WORK WHEN MAKING ARITHMETICAL CALCULATIONS.

By N. B. Odell.

It is a common tendency, when recording readings from instruments or gauges and when making electrical calculations, to use figures that are misleading in that they indicate a degree of accuracy that is impossible. Such meaningless figures can be called non-significant figures. The use of such figures results in much unnecessary and misleading work.

For example, if a common wooden pocket rule is used to measure the diameter of a pulley and the diameter appears to be about 8⅜ inches, it is certainly incorrect to record the measurement as 8.375 inches (0.375 is the decimal equivalent of ⅜). This would indicate that the pulley had been measured to the nearest one-hundredths of an inch. When estimating the circumference of a circle, the diameter of which has been measured, roughly, it is unnecessary and incorrect to multiply the diameter by 3.1416. The number 3.14 is, as hereinafter indicated, often sufficient, or in other cases 3.1 will give a logical result. Accuracy in any result depends wholly upon the degree of accuracy to which the observations or quantities involved can be measured. It does not depend on the number of decimal places used in expressing the result. Quantities involving observed data are quite different in this respect from the pure numbers of absolute value that are employed in ordinary arithmetical operations.

Scales on instruments and gauges can be read to tenths of the smallest divisions marked on the scales. The last figure entered in the record is thus assumed always to be an estimate and is therefore doubtful.

Example 1. 15.57 amperes indicates that the reading was taken from an ammeter scale subdivided to tenths of amperes and that the observer estimated the figure seven. Thus the distance between the lines on the instrument scale is known to be between 15.5 and 15.6 and estimated to be seven-tenths of the length between these two values. It is misleading and furnishes only a clue to what is actually known about this current value to record it as 15.6 or 15.570 amperes.

Example 2. If distance is being measured with a rule subdivided to tenths of inches and, as nearly as can be distinguished, the distance measures seven inches, this should be recorded 7.00 inches, not 7.0 inches or 7 inches.

Example 3. A balance is capable of weighing an object to one hundredth of a gram and one thousandth of a gram can be estimated. The following table indicates the correct records for certain readings:

Reading.	Record.
Eight grams	8.000 grams
Eight and one-half grams	8.500 grams

Eight and seven one-hundreths grams.....8.070 grams
Eight and eighth one-thousandths grams.....8.008 grams
Eight-tenths gram.....0.800 gram

In general a series of readings made with the same instrument should all show the same number of places filled in to the right of the decimal point, even if one or all of these places are zeros.

It is often convenient to express in decimal form readings taken from scales divided into halves of units, quarters, eighths, etc. In all such cases, retain only as many places in the decimal as correspond approximately to the same degree of precision as would be expressed by the fraction; that is, to the nearest half unit or to the nearest quarter unit. If the first decimal figure rejected is five or greater, call the figure one larger than before. A study of the following table should make this clear:

½	0.5
1/3	0.3
¼	0.3
1/5	0.2
1/6	0.2
1/8	0.1
1/16	0.06
1/32	0.03
1/64	0.02
⅜	0.4
⅝	0.6
⅞	0.9
2/3	0.7
¾	0.8
3/16	0.19

etc.

In using data in calculations, whenever the figure following the doubtful (last retained) figure is five or greater than five, increase the doubtful figure by unity. Thus, if but three figures are to be kept, 15.75, 15.76, 15.77, 15.78, and 15.79 would all be entered 15.8. Notice especially that the location of the decimal point has nothing to do with significant figures. Thus 275, 27.5, 2.75, 0.275, 0.0275, 0.00275, etc., are all results expressed to the same degree of precision, and in each case there are three and only three significant figures. The 5 is a doubtful figure in each.

In averaging a series of determinations, in general retain in the result the same number of significant figures as in any one item. But if a large number of items, closely agreeing with one another, are averaged the result may contain one more significant figure than any one item.

In multiplication, after the operation, keep in the result as many figures, counting from the left, as there are significant figures in the factor having the lesser number of significant figures. See the following paragraphs and examples.

In dividing one number by another, keep in the quotient as many figures as there are significant figures in the number having the lesser number of significant figures. Continue the divisions only far enough to determine the required places.

In multiplication and division, ciphers immediately following the decimal point, when there are no figures to the left of the point, do not count as significant. Study the following examples.

(a) $15.75 \times 3.08 = 48.5$.
(b) $0.096 \times 0.096 = 0.0092$.
(c) $0.1523 \times 0.00113 = 0.000,172$.
(d) $720 \times 3.1 = 2,200$.
(e) $900 \times 800 = 720.000$.

In the result of example (e) only the first cipher is significant. It is necessary to add the other three to express the number properly:

(f) $325.6 \div 72.5 = 4.49$.
(g) $0.000,785,9 \div 157 = 0.000,005,06$.

In using constants, pure numbers, and the like, such as 3.1416, 0.7854, etc., do not employ more figures than there are significant figures in the values, depending on experiment, which are used with them in the same calculation. Thus, if the diameter of a circle is measured as 4.51 inches, the area is $4.51 \times 4.51 \times 0.785 = 15.9$ square inches. The use of more numbers in the constant lengthens the computation and gives no better result, because additional figures would be non-significant. They would be meaningless if not incorrect.

Reinspections of Old Buildings in Chicago.

The division of the Chicago Department of Gas and Electricity which was recently created for the reinspection of old buildings is actively engaged in this work. This division consists of seven inspectors, six of whom are located in definite districts, with one inspector in charge of the division. It had previously been the practice to inspect only all new electrical work and to make only such reinspection as could be handled by the district inspector in connection with his regular work. However, it was apparent that although all new work may be installed according to high standards, there was no insurance that work once installed would be kept up to standard. Under the present system the frequency of the reinspections is determined by the particular hazards in each case from the viewpoint of safeguarding life and property.

Louisville Electrical Clearing House Association.

The Louisville (Ky.) Electrical Clearing House Association, an organization of electrical contractors, considered overhead expenses at its last meeting, at which the members also heard the report of the committee named to draw up certain regulations governing underground work and which, it was said, will be adopted at the coming meeting of the Association. Frank A. Good, electrical engineer for F. A. Clegg & Company, delivered the principal address at the meeting, going into much detail on overhead cost accounting and suggesting practicable systems for electrical contractors' use and giving several instances which had come under his observation of how, by failing to make proper allowance for the overhead in their bids and charges, receipts from contracting jobs actually spelled losses rather than profits to the contractors. The members of the Association are taking up matters of shop management, etc., in connection with the technical work they do at the same time.

Licensing Electricians in Highland Park.

The village of Highland Park, Mich., has recently passed an ordinance requiring the licensing of all persons, firms and companies engaged in the electrical contracting business. A license fee of $2.50 is charged and a bond of $500 must be furnished. Licenses must be renewed yearly. Persons violating the provisions of this ordinance are subject to a fine of $100 and costs or imprisonment for a period not exceeding 90 days.

Among the Contractors.

The Wolff Hardware Company, Third Street near Breckinridge Street, Louisville, Ky., has added an electrical contracting department to its business, in charge of Harry Wilder, formerly with the Kentucky Electric Company. The new department started operations with a stock of materials and supplies worth $2,500 and will do a general contracting business.

Eardley Brothers, of Salt Lake City, Utah, have recently installed thirteen 750-watt gas-filled Mazda lamps for the Boston Store in that city, which is the principal dealer in ready-to-wear clothes for women. Eardley Brothers have secured the contract for the electric fixtures in the new Broadway motion-picture house, which will soon be opened; special semi-indirect fixtures are used throughout, the designs being made to harmonize with the interior architecture and decoration of the theater.

The Avery-Loeb Electric Company, Columbus, O., has secured the wiring contract for the Lyon Art Hall, Ohio Wesleyan University, Delaware, O., and for the Second Christian Science Church of Columbus. The latter includes a modern system of indirect lighting. The same company also has the electrical work in the remodeling of the First Spiritualist Church, Columbus.

Dollar Wiring Kinks.

Every reader is invited to contribute to this column. It does not matter how few words are used to explain a "Dollar Wiring Kink," provided the idea is made clear; and if a diagram is necessary, a rough pencil drawing will serve. The idea itself must, of course, be new and bright. A dollar will be sent to the contributor upon publication.

Plugging Outlet Openings.

The junction and outlet boxes used in conduit construction work often have more of the knockout holes open than required as a result of mistakes or changes. Inspectors will not pass boxes with open holes in them. A very cheap and handy plug can be made by punching a hole for a stove-bolt in two tin disks used in connection with paper and felt roofing. One of these should be placed inside and the other outside the box and then fastened by tightening the bolt. After being painted it makes a very neat plug.

Ben R. Browne.

Fuse-Block Protection.

Much trouble was experienced in a factory by the frequent blowing of fuses and the replacement of the same by unauthorized parties. To prevent the replacing of fuses by unauthorized persons, I fastened a 2x4-inch block at each end of the fuse board. To one of these blocks I hinged a hardwood board of such width and length as to cover all fuse plugs. This board was fastened to the other block by means of a padlock. It was hence impossible to replace any fuses except by removing the board, the key to the padlock of which was only accessible to the proper persons.

J. C. Walsh.

Carrying Soldering Paste.

When soldering joints on wires it is very inconvenient to carry the soldering paste around. I decided to devise some scheme whereby the can of soldering paste could be fastened to the blow torch. I therefore soldered a small can to the upper part of the handle of the torch and keep my soldering paste in it. This scheme I found to be very convenient. When not in use a cover should be placed on the can.

D. L. Flynn.

A Convenient Test Board.

The accompanying illustration shows a convenient and easily made test board. This board was made an eight-circuit panel board, only the upper part of the board being used as shown. On this board are mounted a lamp *L*, half of a lamp socket *M*, and the fuse plugs to be tested. The letters *D*, *E*, *F* and *G* refer to the four circuits, each of which can be completed by inserting fuse switches *N*. *A* and *B* are single-pole switches while *C* is a copper strip bent from the positive bus over the negative bus but not touching it.

To test cartridge fuses, the switch *A* should be opened and switch *B* should be closed. The cartridge fuse to be tested should then be held across the two buses, in which case lamp *L* will light if the fuse is good and *vice versa*. Fuses of different sizes can be tested by holding the long ones across the buses at an angle.

Plug fuses may be tested by opening switch *A* and throwing switch *B* down until it makes contact with strip *C*. The plug fuse to be tested should be placed

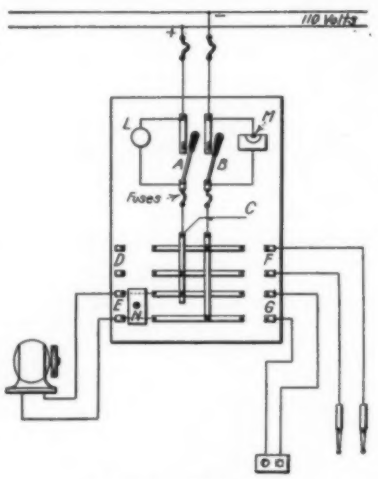


Diagram of Test Board.

in the portion of the socket *M* provided for that purpose. If the fuse is good lamp *L* will light, otherwise the lamp will remain dark.

To test lamps switch *A* should be closed and switch *B* should be in contact with strip *C*. Lamps may then be tested by inserting them in *M*.

Heretofore the switches of circuits *D*, *E*, *F* and *G* were assumed to be open. When these circuits are to be utilized switches *A* and *B* should be closed thus throwing full voltage across the buses. The circuit *D* is reserved for special tests, circuit *E* controls a motor emery wheel on the work bench, circuit *G* is connected to a plug receptacle for attaching motor-driven drills, fans, etc., while circuit *F* is attached to a pair of test plugs for testing for continuous circuits.

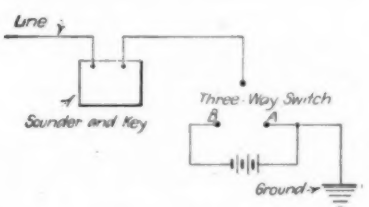
To test for continuous circuits switch *B* should be kept closed and switch *A* opened. A lamp placed in the socket *L* will then be in series with the circuit to be tested and will burn if that circuit is continuous.

This panel can be put to a great many uses. It is distinctly for the electrician, because it is possible to form short-circuits while using the board. For example, if a plug fuse is inserted in *M* when the switches are thrown for a lamp test, the fuse will be thrown directly across the line.

Arthur A. Reeve.

Using Open-Circuit Batteries On Telegraph Line.

On a half-mile telegraph line it was considered undesirable to use the common copper-sulphate cell because it was considered too dangerous to be within reach of children. I therefore employed a set of dry cells and a three-way switch at both ends of the line, the line containing only two instruments. The scheme of connection used is shown in the accompanying sketch. Both switches are normally kept on the point marked *A*, thus disconnecting both sets of batteries and grounding both ends of the line. When either party desires to call the other he does so by turning his switch to the



Telegraph Circuit.

B point. This throws his battery on the line and signals may be transmitted from either end in the usual way. When through communicating the three-way used is again placed on the *A* point. The key levers are normally kept in the closed position.

B. Gunyan.

Remagnetizing Annunciator Indicating Needles.

When the bell on an annunciator rings but the needle fails to indicate the trouble is generally due to the fact that the indicator needle has lost its magnetism. To remagnetize the needle short-circuit the push-button and the annunciator bell. At the same time hold the needle against the armature of the electromagnet that controls it. The battery-current flowing already through the coil of the electromagnet will magnetize the needle in a few seconds.

J. B. Story.

In Hamilton. Ont.. Canada, 600 arc lamps used for street lighting are being replaced by 700 gas-filled tungsten lamps.

Public Service Commissions

Conducted by William J. Norton

CALIFORNIA.

Pacific Gas & Electric Company. The Commission rendered a decision denying the application of the Pacific Gas & Electric Company for a rehearing in the matter of rates to be charged for electric service in Antioch. The company's petition gave figures to show that the Commission's estimate of costs was low by $921.34 and its estimate of revenue high by $460.38. The Commission made entirely new calculations on the basis of the information made available in the company's petition, and renewed the evidence already presented. It finds that the rates established will result in a revenue of approximately $625.74 in excess of the cost of service, and that the net return on the *local* investment will be approximately 10 per cent instead of 8 per cent, the amount theCommission intended to allow. The company's objection on other points—the allowance for overhead charges, the manner of computing the depreciation fund, allowance for going value, etc.—are held to be without merit.

The Pacific Gas & Electric Company has made application to the Commission to issue $1,000,000 par value of general and refunding-mortgage gold bonds. The bonds are to be used in protecting the company's surety in connections with its filing in the District Court $700,000 surety bonds as a guarantee of payment by the company of any sums that the Court may require it to pay in connection with the company's suit for an injunction to restrain the city of San Francisco from enforcing the gas and electric rates recently fixed by ordinance.

COLORADO.

The Colorado Public Utilities Commission created by the legislature of 1913, has been held legal, in the face of a referendum petition, by the District Court. The Railroad Commission, which the Public Utilities Commission supersedes, had power only over steam and electric railroads, and express companies. The new commission has jurisdiction over railroads and express, telephone and telegraph, water, lighting, power and street railway companies. Investigation may be made upon complaint or upon motion of the Commission. The Commission has power to fix rates, to compel extensions and improvements, and to suspend any schedule of rates. It has full power to issue summons and writs for witnesses. The decisions of the Commission are reviewable only by the Supreme Court on application for writ of error.

IDAHO.

Court Case. An important decision was rendered by the Supreme Court of Idaho (141 Pacific Reporter, p. 1083) in which the court upholds the Commission in its stand against permitting unnecessary duplication of electric power companies and harmful competition in the electrical utility field. The action before the court arose upon application of the Idaho Power and Light Company asking for a review of the Commission's orders in the Twin Falls and Pocatello cases. (See ELECTRICAL REVIEW AND WESTERN ELECTRICIAN March 7.) In the orders complained of before the court, the Commission required the plaintiffs to refrain from constructing their proposed plants in Twin Falls and Pocatello. The Great Shoshone and Twin Falls Water Power Company was furnishing electric service in both territories and the Commission held that the electric service was adequate, that the company should be protected from competition, and that a second public utility was not required by public convenience and necessity.

The plaintiffs contended that they were proceeding under franchises secured by the respective cities prior to the date upon which the public utilities law went into effect. On this contention the court says: "It is well settled by the decisions that the making of contracts between individuals, or between individuals and corporations, or municipalities and corporations, as in the case at bar, can never be held to abrogate or prevent the exercise by the state of its police power in any manner that it may consider just or proper. If it were conceded that such contracts could be entered into, every substantial power granted to the Commission by the Legislature in the public utilities act could easily have been nullified and set at naught by the simple act of making contracts prior to the time the act became effective, as was, in fact, done in this case; the act having been approved by the governor on March 13 and gone into effect on May 8; and the franchise contracts referred to passed on April 29 and May 5, respecitively, just prior to the time the act went into effect. Any future exercise by the state of its police power cannot thus be thwarted and prevented by the mere procuring by a utility corporation of the passage of an ordinance by a city or town granting it certain rights. Such contracts must be held not to be protected by any provision of the state or federal constitution against the proper exercise by the state of its police power." .....The court affirms the legality of the Commission's order, under the circumstances in this case, and approves of the wisdom and justice of the findings in both cases. The court goes farther, however, and upholds the legality, wisdom and justice of the provision of the public utilities act, regarding certificates of convenience and necessity, both as to the legislative purpose and the actual results of its enforcement to the policies adopted by the Commission. The court reviews and quotes from the opinions of individual authorities, commissions, and courts, in regard to the desirability of public utility laws, such as the Idaho law, which provided for regulating monopoly and restrict and prohibit competition. The court then points out that the futility of regulation by permitting and encouraging competition has been repeatedly demonstrated and that unnecessary duplication results in economic loss both to the investors and to the customers of a public utility. The court reviews the situation as follows: "By the public utility laws of the several states, attempts have been made on the part of their legislatures to correct existing difficulties between public service corporations and the communities which they serve. The first general steps taken by the legislatures were to provide for rate regulation, in order that the consumer might be protected in cases where there was no competition. Competition at that time was looked upon as a regulator, and rate regulation was accepted as a protection to the public. Competition between public utility corporations led to rate

wars, in which each company tried to get the advantage of or destroy the other, and usually resulted in the destruction of one of the competing corporations, or to a division of the territory between them, or to the consolidation of such corporations. Statutes to prevent such consolidation and to prevent the division of the territory have been enacted. These regulating laws were differently viewed by different classes of people. Those who furnished the money for the construction of the utility system, represented by stockholders, bondholders, or mortagees, was one class; the consumers, another; promoters, another. The latter desire no regulation whatever, since it hampered their ability to sell prospective utilities. On the other hand, the people who furnished the money desired stability for their investment. It was the desire of the stockholder, bondholder, or mortgagee not to have his investment jeopardized, and it was the desire of the consumer to receive the services at a resonable rate or compensation. Rate wars affected such investments, and either one company or the other finally had to go out of business, and experience shows that there can never be any permanent competition in matters of this kind.

"Under these various utility acts, the commission is generally given power to regulate rates and fix a specific rate, instead of a mere maximum, and that took away the opportunity for rate cutting one of the principal instruments of warfare between such corporations. Under the act in question, the Commission is given power to fix the rate absolutely, and neither of the competing companies can charge more or less than the rate fixed. Under those conditions competition can amount to nothing, and the only reason for having two corporations covering the same field is to secure satisfactory service. But, under our utilities act, the Commission is the arbitrator in regard to all matters of service. If the utility corporation is not giving satisfactory service, the Commission has absolute power to compel it to do so. If its facilities are such that the cost of operation is unnecessarily high, the commission can enforce the installation of proper machinery and facilities and a correspondingly proper charge for the commodity furnished. The commission may force the public utility to keep abreast of the times in the employment of proper machinery and appliances in its plants and in the economic conduct of its business. If wasteful methods are indulged in, the public utility must bear the loss, and not the consumer. Thus the reason for competition is entirely taken away."

.....

Considering the justice to the companies, the court says: "The state having taken away the rights of such corporations to fix their own rates, and having assumed supervisory power over the service in every material particular, it ought to provide some sort of a safeguard for those who furnish the money to construct the system, and the state has attempted to meet this situation by providing that the utility already in the field shall have that field unless public necessity and convenience require an additional utility, and as to whether the public convenience and necessity require an additional utility is an administrative matter, left with the Commission to ascertain and determine under supervisory power of the court. Any erroneous action on the part of the Commission in that regard may be corrected by the court."..... In regard to possible opposition to the policy of protection from competition, the court says: "The cry 'monopoly' by promoters and agitators will not be given much weight by thinking people, when they come to study the question of public utilities carefully and to thoroughly consider, from various viewpoints, the welfare and financial interests of those who furnish the money for the construction of utility plants and those who are in need of, and demand, the products of services of such plants for their comfort and prosperity. The public mind has been so long impregnated with the idea that competition is the only relief against oppressive monopoly it is difficult for the people to understand, without some thought and study, that such oppressive monopoly may be removed by fair and just regulation, and where a utility corporation has had no competition in a city or town, and a duplicate plant is proposed for serving the same city or town, and by its promoters better rates are offered, it is but natural for the people to want the reduced rates, and to encourage the erection of a duplicate plant. But experience shows that such duplication must be paid for by the community. But if a public utilities commission can establish reasonable rates, both for the corporation and users of its product, it will in the end be better for all concerned than cut-throat competition."...

The opinion of the court in this regard is especially interesting since both political parties of the state are taking action to favor an amendment of the public utilities law to remove all restriction to competition, permitting companies to enter new territory without first securing a certificate of convenience and necessity from the Commission.

INDIANA.

Rate Increase Granted. The Indiana Public Service Commission has handed down a decision allowing the Greencastle Water Company to increase its rates to private consumers and for fire hydrants on the ground that the existing rates are inadequate to pay a proper return on the value of the property.

The opinion was written by Commissioner Clark. The company's annual income will be increased from $18,128 to approximately $22,500. The Commission established a valuation of $150,000 on the company's property and said that the income under the revised rates would be sufficient to pay a six-percent return on the appraised value of the company's property.

Rates for private consumers will be increased from 30 cents to 40 cents per 1,000 gallons. All services are to be put on a meter basis. Minimum monthly charges will range from 50 cents for a one-half inch connection to $6 for a six-inch connection. All free services are ordered eliminated. The order increases the fire-hydrant rate from $43 to $50 per year per hydrant.

MARYLAND.

New Commissioner Appointed. W. L. Henry, of Dorchester County, Md., has been appointed a member of the Maryland Public Service Commission to succeed Philip D. Laird, former chairman, resigned. Mr. Henry will take office at once and will serve about 18 months to complete Chairman Laird's unexpired term. Commissioner Towers will serve as chairman of the Commission.

NEW YORK. First District.

Changes in Legal Staff. Howard A. Butler and Edward Rigelman have been appointed assistant counsels for the Commission. Mr. Butler has been assisting LeRoy T. Harkness, assistant counsel of the Commission in rapid-transit contract matters and Mr. Rigelman has been assistant corporation counsel in charge of the Street Operating Bureau of Brooklyn.

OHIO.

The Sunnyside Electric Company was authorized to purchase the properties and franchises owned and used by the Dillonvale Heat, Light, Power and Water Company, in the villages of Dillonvale, Mount Pleasant and Adena. The purchase price agreed upon is $45,000.

PENNSYLVANIA.

Consumers' Electric Company. The Commission approved the contract entered into by the Borough of Exeter with the Consumers Electric Company

for the lighting of the streets of the Borough for a term of ten years, with 39 or more, standard Westinghouse, direct-current, series arc lamps at a rate of $54 per lamp per year. The street lighting service has been furnished by the Citizen's Electric Illuminating Company, and this company protested against the approval of the contract with the Consumers' Company. However, at the time bids for this service were being received by the municipality, the Citizen's Company decided not to, and did not, submit any proposals for such lighting service, and, therefore, this company was not considered as a competitor for the service.

The Bell Telephone Company has received permission from the Commission to purchase the Saltillo Telephone Company, Huntingdon County, and the LeRoy Telephone Company, Franklin County.

The Economy Stock Telephone Company. The Commission has approved the company's purchase of the Somerset County plant owned by W. G. Moon.

Harrisburg Light and Power Company. The Commission has approved the contract between the Borough of Penbrook and the Harrisburg Light and Power Company, under the terms of which the company will furnish energy for street lighting for the next five years.

WISCONSIN.

Telephone Accounting. In March of this year the Interstate Commerce Commission submitted a tentative classification of accounts for Class C and D Telephone Utilities to the Wisconsin Railroad Commission and asked that the latter body criticize the classification of accounts before the same was finally adopted by the Interstate Commerce Commission. The Wisconsin Railroad Commission has prepared a brief in which it points out certain objectionable features of the classification of accounts. The Railroad Commission, in general, works on the theory that it is necessary to classify and segregate the accounts so as to determine cost of different services.

Peculiar Accident Causes Suit.

Loss of sight caused by a spark resulting from the contact of a small wire with a high-tension wire, carrying current of high voltage, is alleged in a suit filed by Walter Lyons at Cincinnati, O., against the Andrews Steel Company, of Newport, Ky. Lyons states that the injury occurred while he was engaged in repairing an electric crane which was connected to the high-voltage wires. The amount sued for is $25,557.

Questions and Answers.

All readers of the Electrical Review and Western Electrician are invited to submit questions and answers to this department. Full names will not be printed except where the writer indicates his willingness therefor. Anonymous communications will not be considered. Questions relating to electrical matters of any kind will be inserted. Answers from our readers should be received in this office preferably within ten days of the date of publication of the question, and will be published in a subsequent issue. Payment will be made for all answers published.

Questions.

No. 235.—Size of Rotary Converters.—What limits the size or capacity for which a rotary converter can be built? I understand that certain railways would like to use sizes larger than the manufacturers can furnish.—C. A., Washington, D. C.

No. 236.—Electrolytic Arresters.—Is there any advantage in charging an electrolytic lightning arrester through a resistance, and if so, is this advantage sufficient to warrant the expense of charging resistances for a small system?—R. M., Philadelphia, Pa.

No. 237.—Wireless on Aeroplanes.—Has the use of wireless as a means of communicating from aeroplanes to the ground been perfected? Is it being employed by aeroplane scouts in the present European war?—T. F. S., Augusta, Me.

No. 238.—Reinspection of Electrical Installations.—Has any American city an ordinance or rule requiring reinspection of electrical installations every few years to insure that additions or alterations have been properly made? Is this practice actually carried out in any large city?—J. H. C., Madison, Wis.

No. 239.—Potential Regulator.—About a year ago I heard of a new potential regulator that could be installed outside along the pole lines of a distribution system. What has been the experience with this type of regulator? How does it withstand the weather? Does it require frequent attention?—B. L., Kansas City, Kans.

No. 240.—Life of Gas-Filled Tungsten Lamps.—What is the longest life record as yet attained on test or in service with the new nitrogen-filled tungsten lamps?—P. C. U., Springfield, O.

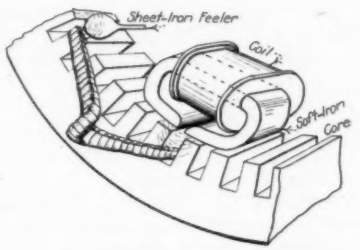
Answers.

No. 231.—Short-Circuit on Induction Motor.—What is the simplest way to test an induction motor for short-circuit in the coils? Does a short-circuit usually burn the coil out entirely?—H. E. M., Galesburg, Ill.

The simplest way to test an induction motor for a short-circuit is to energize each coil from a constant-voltage supply. The different current readings will show the proportionate value of the inductive effects of the coils, and it will therefore, be easy to locate the defective coil. If the magnetic circuit is complete, it is possible to burn out the coil.—E. W. P. S., Cleveland, O.

A short-circuited coil in an induction motor always heats more than the others, and nearly always can be found in this way. In polyphase motors it is sometimes advisable in testing to disconnect the phase windings, and test each separately by applying the proper voltage and current that the group will stand. A short-circuited coil will heat more than the others. A short-circuited coil will sometimes burn out. It must be understood that these tests are to be made with alternating current only.—G. W. C., Rolindale, Mass.

Run motor idle at normal voltage, note vibration and also whether excessive heating occurs in winding. Then shut motor down, run hand over coils and mark with chalk the hottest one, which will enable one to be sure of defective coil after dismantling motor. If motor remains in commercial operation, it is likely that the short-circuited coil will burn out.—A. J., Kokomo, Ind.



No. 231—Short-Circuit Test.

A simple and positive method for testing short-circuit in the winding of an induction motor, alternating-current generator, synchronous motor or direct-current generator or motor armature winding will be found as follows: Place a core (shaped as per sketch) in any coil having sufficient resistance so that when placed across any alternating-current line at hand it will not draw sufficient current to overheat. This apparatus, when placed with the gap in its magnetic circuit across a slot in which lies one side of a coil having a short-circuit, will set up flux sufficient to generate a current in the turns of this short-circuited coil which will, in turn, set up a flux in the iron through which the other side of the coil passes. This can be readily felt by using a feeler of thin soft iron. By running this test coil around the entire bore and at the same time feeling with the feeler across the slot in which the opposite side of the coils under test lie, a definite test can be made and the exact

coil or coils located in a very short time. It depends upon the nature of the short-circuit and the amount of the coil affected as to whether the coil will burn out under normal operation or not. When only a few turns are shorted and the short is positive so no sparking arises the coil might last indefinitely, but for good operation should be replaced.—E. E., Wilkinsburg, Pa.

No. 233.—Life of Vehicle Batteries.—Some 15 years ago the average life of a storage battery used in an electric vehicle was only one year. What is regarded as the average life now of a high-grade battery in vehicle service of medium character, that is, between that of a heavy truck and a light pressure car?—E. P., Chattanooga, Tenn.

A discussion of battery life is of little value unless the variables other than the actual years of use are considered. Many concerns operating trucks use the batteries until they will discharge only 25 per cent of their rated capacity. In pleasure cars used for short daily runs, the low mileage, which is obtainable with the 25 per cent battery capacity, is entirely satisfactory. The truck users place the low-capacity batteries on their short runs, where the standing time (loading, unloading, etc.) is a large percentage of the working day. When the battery is used at 25 per cent discharge capacity, three years (for trucks) and five (for passenger cars) is the life often obtained from lead batteries. The life when expressed in years is not, however, a fair index of the battery performance. A better method would be to give the miles travelled as well as the length of life in years. There are therefore three factors which must be considered in determining battery life: (a) number of years used; (b) total mileage; (c) final capacity. This is very interesting when comparing truck and passenger-car battery life. In the example given above, the passenger car with a five-year battery life apparently makes a better showing than the truck, which gives only three years. But it is doubtful if the passenger car during the five years has traveled over 15,000 miles, while in the three years the truck will easily have gone 18,000 miles. It may be said that the passenger car will cover more than 3,000 miles per year. A few pleasure vehicles do average 5,000 miles per year. With such service, however, the battery lasts only from three to four years, with mileages of from 18,000 to 20,000. The same reasoning applies to trucks, which will average 20,000 miles during two to two and one-half years battery life. If, however, instead of operating the battery until only 25 per cent of rated capacity is obtained, we consider the battery as worn out at 80 per cent capacity, the battery life in terms of either miles or years is somewhat different. With passenger cars it is unnecessary to make this distinction, except in rare instances, where a large mileage per charge is required. The truck user, especially the concern which has a small number, covers routes which are likely to demand a large percentage of the normal mileage. There must also be a surplus available for unusual road conditions, such as snow and mud. The average truck battery with the 80 per cent limit gives a life of from 16 months to two years, varying with the method of handling and the service requirements. The mileage will vary from 15,000 to 20,000. Of course there are conditions when these results are not obtained. The trouble, although sometimes due to poor battery design, is usually caused either by extraordinary operating conditions or by incompetent garage attendance. The alkaline (Edison) battery, although guaranteed to give rated capacity after four years' service, has not been in use long enough to provide authentic figures as to mileage and years of life. The foregoing figures, of course, apply only to lead batteries.—R. E. P., Brooklyn, N. Y.

No. 234.—Vertical Electric Sign.—In the case of a vertical electric sign of box section, about one foot square and about 12 feet high, that is to be mounted on the corner of a hotel building and have lettering on all four sides so as to be easily read from any direction on the intersecting streets, how should the lamps be arranged to get all parts of the letters uniformly lighted and yet use a minimum number of lamps?—C. L. T., Brooklyn, N. Y.

The diagram herewith illustrates about the easiest way to get a good distribution of illumination. Use tubular lamps placed in each of the four corners of the sign, one lamp over another with a clearance space of enough to allow removal of the lamps from the sockets. Use a low-candlepower lamp or a dense glass. A sign one foot square is rather small for such a purpose and I doubt if it would be allowed in a large city where there is very rigid inspection. The diagram shows a section of the sign. Vertical conduits are placed in the corners. —H. E. W., Chicago, Ill.

No. 234.—Vertical Electric Sign.

Important Electrical Work for Gas Company.

An electrical contract of large proportions is to be handled by the Erner & Hopkins Company, of Columbus, O. It includes three plants of the Ohio Fuel Gas Supply Company. The most important is at Treaton, the name given to the little gas-station community near Ashland. An entirely new pumping plant is being built there, including massive machinery, such as compressors and generators, which are to be wired and lights installed. The electric work at this point will amount to several thousand dollars. At Van Buren, a plant destroyed by fire some months ago is to be replaced. After the fire a temporary station was put in, and $1,000 worth of electrical work involved will be torn out as salvage, being valueless for the permanent station. The third plant is at Maple Grove, near Lancaster. This is to be completely overhauled and all wires placed in conduits to comply with requirements of the insurance companies. Since the destruction of the Van Buren plant the company has changed its policy of carrying its own fire insurance.

In the three plants it is believed that 10,000 feet of three-fourths-inch conduit will be required. Although the gas company is producer of an illuminant sold for commercial purposes in competition with electricity, it uses the latter form of lighting altogether at its plants, for purposes of safety. A feature of the Treaton installation will be the electrical work on three handsome residences which the company is erecting for the use of its engineers stationed there.

Germany's Electrical Exports.

An analysis of the exports of electrical machinery and apparatus from Germany during 1913 is given in *Electrical Engineering* (London) in the August 13 issue. The value of German electrical exports has been steadily rising during the last two decades. In 1913 the total shipments amounted to about $72,000,000. During the present war these exports are practically nil.

Of the total given over $10,000,000 represents electrical shipments to Austria, Russia and France. Of the remaining nearly $62,000,000, which represents exports to other European countries and countries in other continents, it is stated by our British contemporary that practically all will revert to the electrical manufacturers of Great Britain, Canada, United States, Switzerland and Italy.

The German export figures give the totals for 24 classes or subclasses of electrical products both by weight and value, but the details of exports to different countries are given by weight only.

TELEPHONE TRANSMISSION IN ITS RELATION TO HIGH-TENSION DISTRIBUTION.[1]

By E. S. Moorer.

The question of the effect of high-tension power tranmission circuits on neighboring telephone circuits is one that is naturally divided into two parts; (1) the effect on circuits at some distance from the disturbing source, in which case the induced currents, though very small, are still sufficient to interfere with speech transmission; and (2), the effect on telephone circuits in close proximity to the power lines. In the first of these cases the conditions are so complex and varied as to practically preclude any general statements as to the effects or the remedies, which should be applied. The second case covers the private lines of power companies, which lines are usually carried very close to the transmission lines, and it is to such conditions as these that this paper has been confined.

From the outset it must be borne in mind that even when equipped with the best devices available, telephone lines carried very close to high-tension transmission lines are a source of danger to the users. This element of danger is such that it could not be countenanced in connection with the commercial telephone lines. In the case of private lines, however, it has often been found necessary by the power companies to run the telephone lines in the exposed region in spite of the accompanying hazard. From a first-cost standpoint it is, of course, advantageous to run the telephone lines on the same poles or towers as the transmission line. Aside from the question of cost it is usually difficult to obtain a separate right of way for the telephone line. Further, for patrol work it is necessary that the telephone line be located conveniently to the transmission line in order that the patrolman may quickly report any trouble which he may find on the line. For the above reasons it has become quite common to employ telephone lines carried on the same poles as the transmission lines and to equip these lines with such devices as will render them reasonably safe, and still allow a grade of speech transmission satisfactory for private-line use. As an additional safeguard it is the usual custom to consider these telephone lines at all times as dangerous high-tension lines.

Taking up the question of telephone lines exposed to high-potential power lines there are two general questions to be considered, as follows:

(1) The potential which will be found on the telephone line.

(2) The means which are taken to counteract the effect of this potential and render the line usable.

There are two general sources of potential on lines of this character, one of which, actual physical contact between the wires, is an accidental condition and therefore relatively infrequent. The second source, induction, is one which is continually present. Induced potential is the result of two different phenomena, electromagnetic and electrostatic induction. It is possible that both of these effects may be found in a single circuit but it will usually be found that one of the effects will predominate.

In case there are several disturbing wires in which the currents are not in phase, the induced voltages from this source may be partially neutralized.

The induced voltage in a telephone line will depend upon the load and the frequency of the power line, and upon the length of exposure, in the case of electromagnetic induction, and upon the voltage of the power line in the case of electrostatic induction.

Practically all transmission systems are three-phase. There is, however, one other type of circuit that is especially troublesome to associated telephone circuits. This is the single-phase alternating-current railway. Trolley voltages up to 11,000 volts are in use and since the return is through the track and ground there is much smaller neutralization of the inductive effects. When the trolley voltage is high the induced voltage may be electrostatic but it has been found that in most cases the greater trouble has been experienced from electromagnetic induction. The induced voltage depends to a large extent on the amount of current which leaves the track and returns through the earth and this depends on the method of distribution employed in supplying current to trains. The question of operation of telephone circuits close to single-phase railway circuits is so largely dependent on the local conditions for each installation as to practically preclude the possibility of any general statements.

In the case of three-phase circuits there are in reality three separate sources of power of the same voltage and frequency but differing in phase 120 degrees. These three sources of power are three windings on one generator. When these windings are connected to a three-wire line the algebraic sum of the voltages between the wires is zero, owing to the difference in phase.

The generator voltage rarely exceeds 13,000 volts, step-up transformers being used to obtain the higher voltages. At the distributing end step-down transformers are used to obtain the voltage required by the load. The transformers may be either delta or star connected and in the latter case the neutral point of the windings may or may not be grounded. If the neutral is grounded this may be done directly or through a resistance.

Inasmuch as, assuming a balanced load, the algebraic sum of the three phase currents and voltages is zero, induction in adjacent circuits under this condition could be practically eliminated by placing the phase wires close together and making this distance between the phase wires small as compared with the distance from the telephone circuits, but even this condition would not eliminate inductive effects if the load is unbalanced. The high voltage of the phase wires, however, requires a large separation and the location of the telephone line is often dependent upon its position with respect to the earth as well as with respect to the power wires. The result is that the inductive efforts will be only partially neutralized and that an electromotive force will be induced on the telephone line. Another feature entering the consideration of the neutralization of inductive effects is the relative position of the power wires with respect to each other. There are three general types of construction employed by which the phase wires are located in a vertical plane, triangularly or in a horizontal plane. Inasmuch as the telephone line is almost always placed below the power line it will be seen that the greatest inductive effects will be experienced when the phase wires are spaced vertically since in this position the neutralizing effects will be the least. In nearly all of the very high-voltage systems the power wires are spaced vertically or approximately so.

The voltage waves from generators and transformers are usually distorted and do not vary uniformly according to the sine law. The distorted waves contain old harmonics of the fundamental, the third and fifth harmonics usually predominating, although higher harmonics may be encountered. These harmonics often cause high voltage peaks and these cause higher static effects in neighboring lines. Also since the harmonics are of higher frequency both the magnetic and static effects in neighboring lines will be increased.

In a three-phase system the three-line currents are one-third of a cycle apart. The third harmonics have three times the frequency of the line

[1] Paper presented before Southeastern Section of the National Electric Light Association, Isle of Palms, S. C., August 20.

current and are therefore in phase. These harmonics exist in the voltage between each wire and the nentral and in a star-connected system the three line wires act as a single-phase circuit having a potential to the neutral equal to the voltage of the third harmonic. This is frequently the cause of static disturbances. When the neutrals are grounded there is produced a triple-frequency current over the three wires with a ground return. Under this condition the electromagnetic induction in paralleling telephone lines is likely to be large.

Having considered the effects on neighboring telephone lines of high-tension transmission lines, there will be taken up the consideration of the telephone lines themselves. There are two general types of telephone lines, one having a single line wire and using the ground as a return and the other using a full metallic circuit. Inasmuch as the telephone line carried on the same poles as a power line is, through induction, at a considerable potential above the earth, the grounded telephone circuit is obviously out of the question since current would flow continuously through the instrument to ground, making the line useless for speech transmission. In the case of a metallic line, the telephone wires will also be at a potential above the earth. However, if this potential is the same in each wire so that there is little or no current flow through the bridged apparatus the transmission qualities of the line will not be seriously affected, at least directly. When apparatus is installed to take care of these potentials to ground it will bring in substantial transmission losses.

In private telephone lines exposed to high potentials it is the usual practice to insert between the line and the telephone instrument an insulating member which is intended to prevent conducting the high voltage to the instruments. In conjunction with this arrangement there are sometimes employed means for reducing the normal line voltage. Because of the fact that the telephone line is continually at a high voltage it will be readily seen that insulation of the line is of prime importance. Any leak to ground from one of the line wires will result in a flow of current from the opposite side of the line through the bridged apparatus, thus rendering the line inoperative. The practice is to employ on the telephone line high-tension insulators having a dielectric strength much above the normal voltage on the line. Special care is taken in all other respects as regards line construction in order to eliminate as far as possible the chance for accidental contact between telephone and power circuits.

At each point on the telephone line where an instrument is located there is inserted between the line and the instrument a one-to-one transformer having a very high dielectric strength between windings. This serves to insulate the instrument from the high-voltage line but at the same time permits the voice and signalling currents to pass over the line with, however, substantial losses in the telephone transmission. This transformer is generally placed in the drop wires and is mounted on a pole carrying the lead from the main line to the building. By this means only the wires connected to the secondary or low-tension side of the transformer are brought into the building.

The transformer is protected against extreme line conditions by means of spark-gap arresters and fuses. The arrester has a discharge voltage above the normal line voltage but sufficiently low to discharge on a voltage which would injure the transformer. Inserted between the arrester and the line are fuses of a comparatively high capacity, but which operate and open the drop wires in case of the flow of a current sufficient to injure the drop wires or arrester. Between the arrester and the transformer are inserted other fuses of lower capacity which open in the event of the passage of a current injurious to the transformer windings.

On the secondary or low-tension side of the transformer is placed another arrester of comparatively low discharge voltage. This is intended to take care of induced voltages on the secondary side of the transformer which would result from an unbalance on the primary side. Also on the secondary side of the transformer it is customary to place a switch by means of which the telephone set is normally disconnected leaving, however, the ringer connected in order that signals may be reecived.

Inside of the switch is located the telephone set and another protector having a still lower discharge voltage. The telephone set usually used consists of an ordinary magneto set having, however, all of the exposed metal parts grounded or insulated from the parts within the set. As a still further precaution most of the power companies provide a highly insulated platform upon which it is necessary to stand when using the telephone set.

One of the most important uses of these telephone lines is that of enabling the patrol man to quickly report any trouble which he may encounter in his trips over the high-tension line. For this purpose telephone sets are located at frequent intervals along the line. The large number of these sets would cause a prohibitive load on the line provided they were all left permanently connected. To obviate this condition, at patrol stations a switch is placed on the line side of the transformer but inside of the arrester and by this means the transformer is normally disconnected from the line. This arrangement, however, introduces an added element of danger in that it is necessary to handle by means of a switch stick the switch which is connected to the exposed part of the line.

For patrol work the telephone set is often the outdoor-type magneto set, having the case and metal parts grounded. Some of the larger companies, however, prefer to install small booths usually within the bases of the towers and to equip these booths with sets similar to those used at permanent stations. Where such booths are used it is customary to install high-voltage disconnecting switches operated from inside the booth. The use of portable sets and means whereby connection to the line can be made at any point is of course extremely dangerous and is very rarely attempted.

One of the most important points in connection with lines of this character is that of transpositions. In any length of exposure one conductor will have induced on it a higher voltage than the other unless steps which are commercially impossible are taken to locate the telephone line in exact balance with respect to the power line. With one conductor at an appreciably higher voltage the line would of course be noisy. To eliminate this condition the telephone line is transposed at frequent intervals and the unbalancing inductive effects are neutralized. It is also important that the power line be transposed at intervals in order that the telephone line may not be exposed continuously to the inductive effect of one phase. It is necessary, however, that the respective transpositions in the telephone and power lines be so located with respect to each other that the effect of transpositions will not be nullified. The transpositions of a telephone line will not of course reduce the voltage between the line and ground. The transposition of a power line tends to reduce the voltage between the telephone line and ground. The amount of this reduction is difficult to forecast with any degree of accuracy in a specific case.

At times there are installed devices intended to reduce the induced voltage of highly exposed telephone line. Such devices consist of some means of draining the induced current to earth. They are objectionable in that they are likely to give the users

of the line a sense of security which might be fatal in case of the accidental destruction of the drainage device. The necessity for drainage is usually indicative of poor line construction or of insufficient transpositions in the power circuit and it is usually found more satisfactory to reduce induced potentials by remedying these conditions. The common form of drainage consists of a coil having two balanced windings so connected to the line that they are inductively in series across the line, but non-inductively in parallel to earth. This readily allows the flow of induced current to earth but opposes the passage of current between the two sides of the line thus reducing the shunt to talking and signalling currents. Another drainage method which has been proposed consists in surrounding the telephone line with grounded metallic conductors which tends to shield the line from static effects. The cost of this method is such, however, as to make its use prohibitive on long lines. A similar effect would be obtained by running the telephone conductors in a cable, but the usual long length of such lines would prohibit this method from a transmission standpoint even were it permissible from the standpoint of cost.

In conclusion it can be stated that a large number of private telephone lines carried on the same poles as, or closely adjacent to power lines, are in operation. They are of course subject to interruptions, these interruptions coming in some cases when the line is most needed. Grounds on the transmission line cause a large increase in the induced voltage and noise on the telephone line. Surges due to switching operations, charging of electrolytic arresters, or other causes cause corresponding surges on the telephone line. The effects of such surges may be only momentary provided the proper form of arresters are used. To take care of emergencies many of the large power companies have arrangements with the local telephone companies over whose lines round-about connections can be obtained between certain important points on the power line. In spite of their limitations private telephone lines are considered indispensable by most of the operating power companies. As to the drawing of any conclusions which can be applied to any case, that is impossible. The peculiar conditions of each specific installation require that it be handled as a case apart. Even when equipped in the best manner known such lines are dangerous and cannot be considered in the same light as ordinary telephone practice.

Electric Luminous Time Signals In Port of Lisbon.

Early in August a system of luminous signals to indicate the time was being placed in operation in the port of Lisbon, Portugal. Two lanterns are fixed upon iron pylons, 100 feet high, located one on the wharf opposite the custom house and the other near the Cordoaria Nacional on the building Porto Franco.

The lanterns have three faces each, 6.5 feet wide by 8 feet in height. On the middle of each face a luminous horizontal line is lighted five minutes before the hour and is extinguished precisely at the hour.

These signals are shown at all even hours during the day and night, being well seen even in daytime about one and one-half miles. The lanterns are marked during the night by three red lights a little below the luminous line where signals are shown.

The clock which lights and extinguishes the lanterns is located near the offices of the Exploraçao do Porto de Lisboa, Caes do Sodré, and works electrically synchronized by the normal pendulum of the Observatorio Astronomico de Lisboa (Tapada).

The error of this pendulum never exceeds some hundredths of a second. These errors will be published every two weeks in the Diario do Governo. Chronometers may be compared any time directly with the clock, which for that purpose also has a hand indicating seconds.

Electricity in Farming.

The use of electricity in connection with the farm has been given a decided boost in a discovery which has just been announced by W. J. Anson, a Southern California inventor. This inventor claims that by the use of his system the growth of the plants may be stimulated and accelerated, much of the time now expended in ditch irrigation may be eliminated and the water bills may be reduced to a minimum. It is also claimed that this new discovery will prevent losses to the trees by extreme heat and winter frosts.

After exhaustive tests this inventor claims that his system aerates the soil, the currents of air and electricity passing through the conduits, causing a capillary attraction, which reaches moisture from a depth of from five to seven feet in the ground. Another important point is that the process causes the soil to so retain moisture as to remain in pulverized condition, instead of baking as in ordinary ditch irrigation. It is claimed that by the use of this system one gallon of water may be made to do the work of forty gallons, used under ordinary conditions. Another feature is that the system is under ground and out of the way, no ground space being wasted for ditch construction.

The process by which these benefits are derived is not complicated. Tile conduits are laid in the soil at depths ranging from 14 to 16 inches, these being located about 10 feet apart. Galvanized wiring is run through each conduit. The current that works these various benefits is derived from a feed line extending across the end of the orchard. Where the process is employed in groves a positive and a negative current are run, one on either side of the row of trees, with an upright tile outlet at each tree. At the top of each outlet is a resistance coil. In the cold weather these coils are heated by electricity, the current being governed by a thermometer which automatically opens a switch the moment the mercury goes below a given point. When the trees are threatened by frost this automatic regulation of the current creates in the coil enough heat to keep the atmosphere around the trees at a safe temperature, thus taking the danger out of the possible freeze. Some of the trees around which this system has been used in Southern California have attained an annual growth of new wood of as much as 20 inches, which, according to nurserymen, is remarkable.

Grouping Overhead Wires.

Separation of the electric lighting and telephone wires on the streets of Lexington, Ky., will be undertaken soon in accordance with an agreement reached between officials of the Lexington Utilities Company and the Fayette Home Telephone Company, provided the City Commission approves the plan. This has been based on the proposition that all the wires of either concern shall be moved to the sides of the streets where they are most numerous now, each street being considered by itself. The work is to be undertaken immediately.

Municipal Ownership in Toledo.

The voters of Toledo, O., endorsed on August 4 a proposition to issue $8,000,000 in bonds to take over the car lines and plants of the local street railway company.

Franchise Defeated in McAlester.

The proposed franchise for the Southwest Cities Utilities Company in McAlester, Okla., was defeated at a special election held on August 25 by a large majority.

A bandstand at Coventry, England, has been excellently illuminated by means of an indirect lighting fixture.

Sandusky Electrical Situation.

A recent report which obtained currency in Sandusky, O., to the effect that H. Whitford Jones, the municipal electrical engineer of Cleveland, O., who has been retained to survey the conditions in Sandusky and make recommendations as to a plan for lighting the city, had filed his report, was vigorously denied last week by J. Frank Donahue, chairman of the Lighting Committee. It was reported that Mr. Jones had recommended placing all wires in the business district underground, and replacing the present arc lighting system by ornamental lamps, in the business section as well as in the parks and residence districts, at a considerable increase in cost. Rates have not yet been determined upon by the committee, nor have other details been settled. The various companies having wires in the business section of the city declare that it will be impossible, on account of the cost, for them to place their wires underground, and they were much relieved, therefore, when the report referred to was denied.

Panama Exposition Not Affected By War.

President C. C. Moore of the Panama-Pacific International Exposition at San Francisco states that at no time had the directors a thought of postponing the opening date of the Exposition on account of the European war.

The conditions now existing are that 44 states of the Union have made appropriations and are actively engaged in building state pavilions and preparing their exhibits. The various state appropriations are made for a stated period and a delay in the Exposition would necessitate going to the legislatures for more money. The exhibit palaces are completed and the installations have already begun on a large scale, and it is the desire of the exhibitors to proceed with the arrangements as they have planned.

Thirty-four foreign nations have made appropriations and are actively engaged in erecting their official buildings and preparing their exhibits regardless of war, so that any postponement in the Exposition would complicate the situation.

There is nothing in the present situation that seems likely to affect the plans or success of the Exposition. Of the 34 foreign nations that are now preparing buildings and exhibits, only three are concerned in war, and none of these have yet indicated that its arrangements for participation will be interrupted. France and Italy have cabled that their preparations to participate are proceeding despite the war. The possible loss of exhibits from countries involved in war will be replaced by increases in other directions. The effect on the attendance will be favorable, for whatever is lost from Europe will be ten times compensated by Americans and South Americans, especially Argentines, coming here instead of going to Europe. Argentina cabled under date of August 13 that they were preparing to increase their exhibits and accordingly requested the Exposition officials to assign them additional space. Brazil also cabled that they intended to proceed with larger plans for an exhibit at this Exposition. China, the first time in its history, has made application to display machinery, and space has been assigned the Chinese Republic in Machinery Palace in addition to assignments in the other exhibit palaces.

Important Interurban Line Opened in Utah.

About 750 residents of Salt Lake City, Provo and intervening Utah towns along the new Orem interurban electric line celebrated the formal opening of this line in Provo on August 14 by a banquet given by the Provo Commercial Club. A special train drawn over the Orem line carried 120 passengers from Salt Lake City and Ogden. Governor William Spry of Utah, Mayor C. T. Decker of Provo, and Mayor Samuel C. Park of Salt Lake City, spoke of the great benefit which this new line will be to the territory served by it and urged the residents along the line to give the company their loyal support. W. C. Orem, president of the Salt Lake & Utah Railroad, told the story of its promotion and reviewed in brief the history of the construction work. He thanked the county and city commissioners present for their aid in granting franchises and for generally co-operating with the officers during the construction of the road.

Suggestion for Annual Electric Vehicle Day Broadened to Electric Day.

Not only is a recent suggestion that a certain day in each year be set aside as "Electric Vehicle Day" being taken up with good prospects of the idea being realized, but the original suggestion is further extended to include all branches of the electrical inndustry. The first suggestion came from Robert Montgomery, manager of the commercial department of the Louisville, Ky., Gas & Electric Company, who has lately received a letter from the secretary of the Electric Vehicle Association of America, in which he advises Mr. Montgomery that the suggestion has been taken up by the officers of that organization who regard it favorably and that it will be put before the Executive Committee with the end in view of applying it internationally.

Mr. Montgomery has replied that though he was quoted only as regards the electric vehicle that he had thought of including all electric lines in the annual demonstration. He went on to elaborate, pointing out that some anniversary, such as the date when the incandescent light was first made use of commercially, could be decided on for an annual demonstration of what is being done electrically. The newspapers, he suggested, could be persuaded with the right sort of cooperation from their advertizers to get out special electrical editions on that day, while there could be parades, and exhibits, and contests, speeches, picnics, etc., all of them contributing to the greater publicity of all things electrical. The idea is being discussed generally and with much favor in Louisville and other cities.

To Enjoin Block Lighting Plant.

Suit has been filed by the city of Cincinnati, O., against the Diamond Light Company, seeking to enjoin the company from laying, maintaining or using conduits or wires placed without proper authority on the streets of the city. This action arose out of the recent controversy in the City Council, in the course of which it was asserted that the company was preparing to engage in the business of furnishing current to consumers without franchise authority. It is charged that the company has already laid wires for the purpose of supplying current to concerns in the vicinity of its plant, which is furnished with power from engines installed in the Gayety Theater.

Rubber Tires for Street Cars.

At the recent session of the Tramways Association of Great Britain in Newcastle one of the speakers suggested the introduction of rubber or some other silent material for tires to street cars.

The speaker contended that a properly designed tire for street cars would exceed the life of tires on motor buses and motor wagons, on which a life of 20,000 miles and over was common; that the wear and tear on the rails would be reduced; that the cost of maintenance would be largely eliminated; and that the corrugation problem would be solved.

The question of doing away with noise and vibration, it was contended, was a strong argument in favor of rubber tires. A higher rate of speed could also be attained.

Electric Club-Jovian Outing.

The joint basket picnic and outing held by the Electric Club of Chicago and the local Jovian League, at Ravinia Park, Ill., August 20, was eminently successful from every standpoint and will long be remembered as a "monument" to the untiring efforts of those directly responsible. About 475 members and guests of the two organizations participated and all were kept busy during the entire day, there being over 40 events on the program. Races of all descriptions, games, water events and music were provided and in spite of the fullness of the program none of the customary delays and confusions were apparent.

Two special trains over the Chicago & North Western Railway were run, one leaving at 9:35 a. m., and one at 12:15 p. m. Badges, souvenirs, candy and cigars were distributed on each train and music was furnished enroute and on the grounds by the Chicago Telephone Company band.

The general joint picnic committee responsible for the success of the affair was composed of H. A. Mott, chairman, Otis B. Duncan, F. W. Harvey, Jr., Victor H. Tousley, Otto J. Kaberna, Victor Despard, George C. Keech, Joseph Vraneck, R. S. Peirce, Edward F. Kirkpatrick, and Robert Cline.

Prizes amounting to $1,000 were donated for the various events and these were displayed in two show windows of the Electric Shop of the Commonwealth Edison Company previous to the picnic. The two accompanying illustrations show these windows with the prizes in place.

The following are the winners in the various events.

List of Events and Winners.

"Cupids'" 50-yard dash—Leo Mockenhaupt, first; Otto J. Kaberna, second; L. C. Jones, third.

Plump ladies' race, 25 yards—Mrs. F. W. Harvey, Jr., first; Mrs. Pertle, second; Eva L. Burton, third.

Men's 100-yard dash—L. A. Stanton, first; Otto Mueller, second.

Girls' 50-yard dash (for girls over 18)—Dorothy Prindeville, first; Gladys Conklin, second.

Men's three-legged race—J. J. Carrick, T. Waage, first; V. C. Blott, A. Wohloyezone, second.

Four-man relay race—C. Dubsky, H. G. Hafner, W. S. Taussig and Otto Mueller.

Ladies' egg race—Irene Frankel, first; Mary Prindeville, second.

Ladies' needle-threading race—A. Yager, first; Mrs. E. A. Kramer, second; Mrs. H. Farrington, third.

Matrons' 50-yard dash—Mrs. H. Farrington, first; Mrs. K. L. Hort, second; Mrs. H. Ehrlich, third.

Ladies' tunic skirt race—Gladys Conklin, first; Edna B. Frank, second; Jean MacFarlane, third.

Ladies' ball throw—Mrs. Hodge, first; Irene Frankel, second.

Men's 50-yard swimming race—J. W. Briggs, first; C. A. Prindeville, second.

Ladies' nail-driving contest—Mrs. John Nouta, first; Mrs. J. Vranek, second; Miss Lillian Fick, third.

Men's water race—J. W. Briggs, first; Thomas Waage, second; J. J. Carrick, third; C. A. Prindeville, fourth.

Girl's water race—Dorothy Prindeville, first; Marie Flavin, second; Marion Youngquist, third.

Girls' swimming race—Marie Flavin, first; Marion Youngquist, second.

Matron's water race—Mrs. E. B. Scott, first; Mrs. F. H. Bliss, second.

Electric Club 50-yard dash—Leon C. Herrmann, first; F. L. Carl, second; H. B. Green, third.

Jovian 50-yard dash—E. J. Hansen, first; Otto Mueller, second; W. E. Lanz, third.

Tango contest—Miss Rowena Bastin, W. B. Cummings, first; Lillian Sheridan, W. J. Buettner, second.

Horseshoe throw—E. Gilroy, first; W. E. Lanz, second; R. I. Phillips, third.

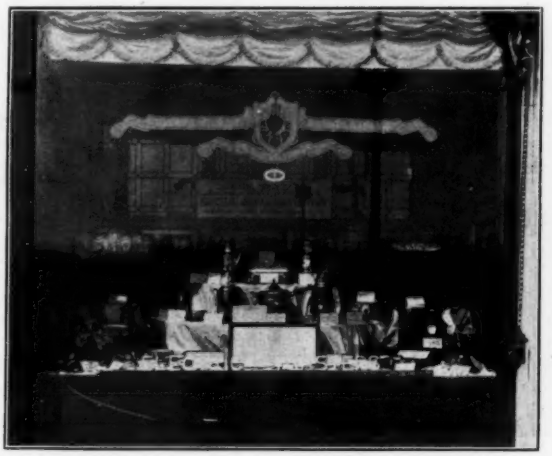
Most attractive bathing costume—Mrs. E. B. Scott, first; Mildred Crowen, second.

Men's bowling contest—L. H. Keller, first; H. W. Eddy, second; C. W. Forbrich, third; P. Forbrich, fourth.

Ladies' bowling contest—Mrs. F. W. Harvey, Jr., first; Mrs. Foster, second; Mrs. Hart, third; Mrs. Van Scoy, fourth.

Guessing feet of wire on reel (for men)—O. W. Youngquist, first; Francis Baldwin, second; H. M. Webber, third.

Guessing attendance—Mrs. J. H. Riddel.



Two Show Windows of the Electric Shop, Showing Display of Prizes Awarded at Electric Club-Jovian Outing.

Guessing beans in jar (for women)—Mrs. H. A. Brower first; Mrs. R. L. Wildauer, second; Mrs. O. J. Kaberna, third.

Holder of lucky number ticket—R. E. Green.

In addition to the above there were 10 events for children for which suitable prizes were awarded. A tug-of-war between Electric Club and Jovian League resulted in victory for the former, while a five-inning base-ball game was won by representatives of the Jovian League.

Maine Plant Damaged by Lightning and Fire.

One of the power stations of the Central Maine Power Company, Waterville, Maine, was damaged to the extent of over $30,000 by a fire resulting from lightning on August 11. Much of the electrical machinery was flooded and the building itself so damaged that it will be necessary to completely rebuild it.

Hydroelectric Power Development in Germany.

An interesting report on the hydroelectric development of water powers in Germany has been made by United States Consul General Robert P. Skinner, of Berlin. It has been made public in the August 17 number of *Daily Consular and Trade Reports.*

The electric works in Germany, as a rule, are driven by steam power, a large part of the country being so flat that any considerable hydroelectric enterprises are out of the question. In Berlin steam produces 250,000 horsepower in existing establishments, and in Westphalia and the Rhine Provinces there are many electric plants driven by gas. At Halle, on the Saale, steam and Diesel engines produce 16,000 horsepower. Machinery manufactured by the Allegemeine Elektrizitäts Gesellschaft and by Siemens & Schuckert Aktiengesellschaft furnishes power in the following plants:

	Horsepower.
Stralsund	15,000
Stettin	15,000
Hegermuhle bei Eberswalde	10,000
Belgard in Pomerania	1,000

Undoubtedly the most important water power establishment in Germany at present is the one at Wyhlen, near Basel, within which the Allgemeine Elektrizitäts Gesellschaft machinery produces 40,000 horsepower. These works are controlled by the Kraftübertragungs-Werke Rheinfelden, the headquarters of which are located at Badisch Rheinfelden, where the same concern also has a large plant, the power in both cases being derived from the Rhine. The Wyhlen works were opened on September 1, 1912, after being under construction 4.75 years. The works at Rheinfelden were begun 15 years earlier. The company has a capital of 12,000,000 marks ($2,856,000). This enterprise is the result of a common effort between the German concern and the Swiss Canton of Basel City. The cantonal authorities first proposed to build independent works, 6.3 miles above Basel, where there is a fall in the Rhine of 16.4 feet. Eventually the German and Swiss interests were consolidated, and the Kraftübertragungs-Werke Rheinfelden Aktiengesellschaft, obtained the concession.

Before the German and Swiss interests were fused there was a prolonged discussion of the subject, participated in by the Grand-Duchy of Baden and the Swiss Cantons of Argau, Basel City, and Basel Land, and the principal point discussed was the advisability of giving over the concession to a private corporation. The Canton of Basel City reserved the right to be represented in the board of managers of the corporation and in the financial management, and provided for the interests of future users of current. The profits of the concern are limited by the terms of the concession, and should they be exceeded, consumers are entitled to a reduction in rates. During the fiscal year 1913 the company's net earnings were 1,055,993.40 marks ($251,326), and it paid a regular dividend of eight per cent and a super-dividend of four per cent out of the available surplus.

The Kraftübertragungs-Werke Rheinfelden furnishes energy directly to a population of about 56,000 inhabitants. In addition to this direct service a large amount of energy is delivered to middle organizations, societies, and overland power works, which dispose of the same to their members or consumers. The current is furnished at a tension of 130, 220, and 500 volts, or at a high tension of 6,800 volts or more. The following are the prices per year, per lamp paid by consumers for electric current:

Carbon lamps:	First category.	Second category
10 candlepower	$1.26	$2.28
16 candlepower	1.90	3.80
25 candlepower	3.09	5.71
Metal filament lamp per candlepower	0.057	0.095

The "first category" includes lamps in bedrooms, drawing-rooms, cellars, stables, and warehouses; the "second category" includes living rooms, kitchens, passages, offices, and workshops.

Rates for a 500-volt current for industrial purposes are quoted per kilowatt-hour as follows: For the first 10,000 kilowatt-hours, $0.0214; 10,001 to 20,000 kilowatt-hours, $0.019; 20,001 to 30,000, $0.0166; 30,001 to 50,000, $0.0142; 50,001 to 80,000, $0.0119; 80,001 to 120,000, $0.0107; 120,001 to 150,000, $0.0099; 150,001 and more kilowatt-hours, $0.0095.

Other important hydroelectric works are in course of construction at Lauffenburg on the Rhine, between Schaffhausen and Rheinfelden; at Neuhausen near Schaffhausen (this plant especially for operating aluminum works, where 10,000 horsepower is to be developed). The greatest enterprise of all is to be constructed at Walchensee near Munich, where 50,000 horsepower is to be developed. As far as has been ascertained, no American machinery has been used in these various enterprises.

Data concerning other important German hydroelectric plants are appended.

GERMAN WATER-POWER PLANTS.

Name of place.	Constructed.	Opened.	Horsepower.	Total cost.
Eschbachtal bei Remscheid	1889-1891	.....	.....	$ 232,764
Neyetal	1891-1893	.....	.....	1,071,000
Munich	.....	1893	9,000	.....
Fuelbecke bei Altena	1894-1896	.....	.....	79,016
Heilenbecke bei Milspe	1894-1896	.....	.....	95,200
Wupper River	.....	1896	1,000	.....
Lingesal bei Marienhaide	1897-1898	.....	.....	725,900
Bevertal bei Huckeswagen	1896-1898	.....	.....	
Salbachtal bei Ronsdorf	1898-1899	.....	.....	219,674
Herbringshausertal bei Luttringhausen	1898-1900	.....	.....	616,658
Albbruck (Black Forest)	.....	*1900	1,080	.....
Sengbachtal bei Solingen	1900-1902	.....	.....	990,556
Haspertal bei Haspe	1901-1903	.....	.....	508,844
Hennetal bei Meschede	1901-1905	.....	.....	933,000
Ennepetal bei Radevormwald	1902-1904	.....	.....	1,142,400
Glorbachtal bei Breckerfeld	1903-1904	.....	.....	214,438
Oestertal bei Plettenberg	1903-1906	.....	.....	424,830
Jubachtal bei Meinerzhagen	1904-1905	.....	.....	160,174
Panzertal bei Lennep	1905-1908	.....	.....	92,582
Ennepetal	.....	1905	720	.....
Mohnetal Kreis Soest	1908-1911	.....	2,000	4,998,000
Listertal bei Atterdorn	1909-1911	.....	.....	975,800

WATER-POWER PLANTS WITH STEAM AUXILIARY.

Name of place.	Opened.	Horsepower.	Name of place.	Opened.	Horsepower.
Lauffen-Heilbronn	1892	1,600	Neckarwerke	1901	4,160
Borstendorf (Saxony)	....	1,000	Augsburg (Lech)	1902	13,900
Isarwerke (Munich)	1895	15,600	Augsburg (Stadtbach)	1902	3,100
Eichdorf-on-Bober	1896	1,275	Solingen	1902	1,550
Rheinfelden	1898	16,800	Riebingen (Wuerttemberg)	1903	1,350
Gersthofen	1899	6,000	Schweinfurt	1905	800
Dahlerau-Schwenke	1899	1,200	Wangen im Allgau	.....	1,260
Lausitzer Elektr. Werke	1898	1,500	Heimbach (Eifel)	1905	12,000 to 16,000
Grottdorf (Saxony)	1900	1,360			
Kehl (Rhine)	1900	1,600	Hastedt (Weser)	....	12,000
Murnau-Oberammergau	*1900	1,060			
Hirschau (Munich)	....	1,000	Marklissa (Silesia)	1907	2,100 to 3,500

WATER-POWER PLANTS UNDER CONSTRUCTION.

Mauer im Schl	1912	9,600	Laufenburg	†1914	50,000
Hemfurter Sperre	†1914	2,000 to 3,000	Wylen-Angst	†1912	40,000
			Weser River	†1914	15,000
Walchen-und Kochelsee (Bavaria)	(‡)	56,000			

PROPOSED PLANTS.

Saaletalsperre	....	10,000 to 20,000	Lake and river basin (West Prussia)	.....	54,360
Bodetal (Harz)	....	27,000	Lake and river basin (East Prussia)	....	47,000
Boer and Queis (Silesia)	....	9,000			
Glatzer Neisse (Silesia)	....	3,000	Lake and river basin (Pomerania)	....	49,820
Nasurian Channel (East Prussia)	....	13,000			
Frankenwalde	....	12,000	Bavaria	....	700,000
Main canalization	....	24,000	Altzentwurf (Bavaria)	....	45,000
Oder canalization	....	36,000			
Mosel canalization	....	50,000 to 109,000	Several places on the Rhine, in all	....	300,000

* About. † Ready. ‡ In construction.

SOUTHEASTERN SECTION OF THE NATIONAL ELECTRIC LIGHT ASSOCIATION.

Second Annual Convention, Charleston, S. C., August 19, 20 and 21.

The second annual convention of the Southeastern Section of the National Electric Light Association was held at the Isle of Palms, Charleston, S. C., on August 19, 20 and 21, with an attendance of about 100. The first session was called to order on Wednesday afternoon at 2 o'clock. The address of welcome was made by Mayor John P. Grace, who was introduced by P. H. Gadsden, president of the Consolidated Railway, Gas & Electric Company.

Thomas W. Peters, president of the Southeastern Section, then delivered an address.

A paper entitled, "The Central Station's Greatest Opportunity: the Electric Vehicle," by A. L. Dixon and F. N. Carle, was presented by Mr. Carle. The authors mentioned three things which have retarded the adoption of the electric vehicle by the smaller central stations. These are (1) the relatively slow perfection of the electric by the manufacturer; (2) the unsatisfactory experience of some central stations with current-consuming devices; (3) the wrong presentation of the electric to the central-station manager by the vehicle manufacurer. A great industrial development in the South was prophesied for the next decade. The central station is a leader in local development and commercial growth and should see to it that the electric vehicle is introduced for delivery service, heavy trucking and other uses for which it is applicable. The foundation of an off-peak load built up through electric vehicles lies in the close personal touch of the central station with the customer. Figures were given showing what the electric vehicle has accomplished in other parts of the country. The manufacturer hopes for co-operation with the central station so that the latter will be able to prove the electric suitable for its own work and it can then indorse the electric for the work of merchants and manufacturers. Thus a steadily increasing off-peak load may be built up.

The next paper was by Norman B. Hickox and was entitled "Commercializing Electric Advertising." In the absence of the author this was read by Secretary A. A. Wilbur. It will be found elsewhere in this issue.

In the discussion of this paper, W. La Portes, of Charleston, gave an illustration of the advertising capacity of electric signs. Recently the "blind tigers" in Charleston were advised to discontinue their electrical displays on account of the publicity thereby given. Too much vigilance cannot be exercised in regard to the general appearance of signs. This is a factor which strongly affects new installations. Every effort should be put forth to secure a flat-rate contract, which includes renewals of lamps, repairs for flashers, etc. This would eliminate many complaints. The flat-rate specifies definite hours of burning, which is a decided advantage to all concerned.

A large electric sign with the letters N. E. L. A. was donated by the Greenwood Advertising Company to the Association and was mounted in the pavilion, where it was lighted every evening during the convention.

In the evening, an informal dance was given.

At the session on Thursday morning the first paper presented was by E. S. Moorer and was entitled "Telephone Transmission and Its Relation to High-Tension Distribution." This will be found elsewhere in this issue.

This paper was discussed by C. M. Young, of Columbus, Ga., and G. K. Selden, of Atlanta, Ga. Mr. Young spoke at some length of the private telephone system of the Columbus Power Company, which operates over a distance of about 80 miles. He described the type of insulators used on both the wooden poles and the steel poles which enter into this system. Mr. Selden described the troubles experienced by the Southern Bell Telephone Company due to induction from high-tension transmission lines. Mr. Moorer then closed the discussion.

A paper by A. D. Fishel entitled "Feeder Voltage Regulation" was read by E. A. Thornwell. This paper described and illustrated apparatus of the Westinghouse Electric & Manufacturing Company for the regulation of feeder voltage, and pointed out the advantages of such regulation to the central station. A constant supply voltage results in increased revenue from the sale of energy and this is sufficient to justify an investment for regulating apparatus. This can best be done by automatic regulators. Where central stations in small towns purchase their power from transmission companies there is special need for feeder regulators. Where a polyphase feeder regulator is used the load must be fairly well balanced, since the voltage fluctuations in one phase control the operation of the regulator and the three phases are affected simultaneously. Where balanced conditions do not exist, single-phase regulators were recommended. The induction type of regulator was stated to be the most satisfactory. This is now built in rugged form so that it can be used in automatic substations without regular attendants. The essential characteristics of such apparatus were then discussed.

This paper was discussed by H. A. Orr, of Anderson, S. C., and C. M. Young, of Columbus, Ga., both of whom pointed out that on long-distance transmission lines it is desirable to have some form of regulation at both ends of the line. At the substations the regulator takes care of the feeders radiating from it. The regulator at the generating station provides regulation on the main transmission line. It would be desirable if the manufacturers would put on the market a cheap type of pole regulator which could be used to regulate the voltage on long spans of secondaries where the loads are subject to rapid fluctuation.

In closing the discussion Mr. Thornwell stated that the manufacturers are now working on just such a type of regulator, but that the price would not likely be lower than that of the present feeder voltage regulator on account of the fact that the material and labor involved are not much different.

The final paper at this session was one by T. W. Moore and Henry Schroeder entitled "Recent Developments in Incandescent Lamps." This paper gave a brief history of the developments of electric lighting and of the incandescent lamp, showing the various steps which preceded realization of the present high-efficiency tungsten lamp. The gas-filled type of lamp was finally referred to and a statement of the sizes and efficiencies now available was given. Experience with these lamps shows that the bulbs are apt to crack only in the large sizes if rain or snow strikes them while burning. They should, therefore, be protected from the weather. If put in a fixture which is not properly ventilated the bulbs will rapidly blacken.

This paper brought forth considerable discussion by not only representatives of the manufacturers but of the central station, due to the marketing of the new type C lamps, especially as small types as 200-, 300- and 500-watt lamps will very shortly be available.

It was brought out that the new lamps increase the horizontal candlepower per watt and that the light was given off in more uniform direction than that from the old-type lamps. It was strongly recommended that some form of diffuser be used with these lamps so that the eye might be protected from the intense light given out by this new lamp. It was also recommended that in the larger sizes of lamps a special ventilated holder be used so that life of the lamp may be increased by allowing the heat to escape.

It was also brought out that it was very desirable, especially with street lighting, to use a high-amperage lamp. This may be done by the use of current transformers or compensators. By the use of the high-amperage lamps a longer life may be obtained and a more rugged lamp be substituted for the present series filament. These lamps are now being used in many fields which previously the central stations were unable to handle, due to the high cost of the different apparatus which had to be used, chief among which was that of lighting of photographic studios.

Mr. Martin, of Atlanta, brought out the fact that the melting point of tungsten was about 3,100 degrees Centigrade. The temperature of the vacuum lamp is 2,100 degrees. The temperature of the gas-filled lamp is 2,500 degrees.

George H. Wygant, of Tampa, Fla., stated that he had obtained very good service from the larger lamps and that he expected to be able to use the new 200-watt type to replace three-mantle gas arcs, and the 300-watt lamps to replace five-mantle gas arcs.

In the afternoon an excursion was made on the steamer Sappho around Charleston Harbor, visiting Fort Sumter. Refreshments were served on board and music was rendered by a military band and a vocal soloist, Mrs. Caroline N. Curran.

A session was held in the evening, the first paper being by John S. Bleecker, entitled "How, When and Where, or a Few Irregular Thoughts on Regulation." This dealt with the regulation of public utilities by commissions and gave a number of quotations from the opinions of the various state commissions showing that competition is not practicable in the utility field. Rates, service and rate of return on investment were discussed.

In discussing this paper J. E. Bigham brought out the fact that the public were demanding regulating bodies, as well as the central station. As regards the scope of these bodies, he stated that there were fully as many different opinions as there were people. He further stated that while rates and rates of return on investment were not necessarily unknown quantities, they were subject to much fluctuation or differences in various communities, and that those which proved satisfactory today may be discarded tomorrow because of changed conditions. He also said that although people through their law-making bodies have decided to regulate by commission, what power shall regulate the commission? Shall it be public opinion? When shall we regulate? Shall it be always at the time the public demands?

After discussing the question of government ownership of telephone and telegraph lines, Mr. Bigham quoted the following:

"It isn't a bad idea sometimes when somebody comes along and asks us for a job, to look into the qualifications for the purpose of ascertaining whether or not, when the time comes, he will do the work entrusted to him in a fairly business-like manner. Wherefore, when Uncle Sam turns up at our front door and pleads to be made general manager of telephone service and our telegraph interests and our railroad ventures, it is only fair to ask him just how far he has been successful in the other line. He is a nice, amiable, old gentleman and there is no gainsaying the fact that he wants everybody to be happy, but is he capable? That is the question. There is many a man in this world with whom we should all delight to play golf, but would we trust him with our most important affairs?"

The report of the Public Policy Committee was then presented by John S. Bleecker. This report showed that competition was not feasible in public-utility service, since active competition results in duplication of plant and destructive cuts in rates. These are almost invariably discriminatory and result in ultimate consolidation of the competing companies and adjustment of rates on a higher level. Potential competition would be desirable and effective, but since it may become active, it is not so valuable as regulation. The policy of regulation should prevent undue returns on investments in public utilities and at the same time insure a reasonable return. Efficient regulation implies prohibition of competition and of discrimination. A regulating body should have authority over municipal plants as well as private companies, both before and after their establishment.

At the session on Friday morning an address was made by S. A. Sewall, assistant to the secretary of the National Electric Light Association, on "The Activities of the Association as a National Body."

A paper was presented by Mac Dougald Dexter entitled "A New Method of Indicating and Recording River Stages." The pneumatic gauge system, as employed by the Columbus, Ga., plant was described as one solution of the problem of obtaining a continuous and accurate record of the elevation of water in streams, reservoirs and tailraces. Some of the advantages of this pneumatic system as extolled in Mr. Dexter's paper, are that it is not affected by temperature changes, the ease of installation in what would be difficult, expensive or inaccessible places for other methods and the fact that the point of air supply, or the recording gauge can be distant from the river to be measured. The gauging device is simple. A small hollow wire, similar to that used in pressure gasoline lighting systems, is run from a fixed point in the river below water mark to a suitable recording or indicating gauge graduated in feet of water column, and into this line another hollow wire is connected to supply a very small amount of compressed air. The amount of air is regulated by a needle valve with a very small seat opening.

Before closing the session the following resolution was presented by J. S. Bleecker and was adopted by the meeting:

Whereas, one of the objects of this Association is to establish cordial and beneficial relations with the public, and,

Whereas, regulating commissions have been established by the public in many States for the same purpose; now, therefore,

Be it resolved, That it is the sense of this Association that we endorse as sound in principle those expressions of the Railroad Commission of Georgia looking towards this end, which read in part as follows:

"We do not believe competition can ever be a consistent and proper regulator of rates and other conditions in the public utility field. We earnestly believe that it would be wise if the Legislature would prohibit the building of duplicate public utilities * * * prior to issuance by commission of certificates of public convenience and necessity."

Before adjourning a rising vote of thanks was expressed by the Association to the Elks' Club, the Country Club, the Commercial Club, the Charleston Club and the Carolina Yacht Club for their courtesy in extending the privileges of the several clubs to the members during their stay in Charleston. Thanks were also expressed to the local entertainment committee, of which Messrs. Fuller and Benedict were prominent members.

At 1 p. m. an executive session was held, at which the following officers were elected:

J. E. Bigham, of Tampa, Fla., president; W. A. Belcher, of Cordele, Ga., first vice-president; C. M. Benedict, of Charleston, S. C., second vice-president.

Executive Committee: C. D. Flanagan, of Athens, Ga.; Alfred Wallace, of Columbia, S. C.; W. E. Mitchell, of Birmingham, Ala.; C. I. Day, of Jacksonville, Fla., and H. W. Plummer, of Asheville, N. C.

Public Policy Committee: P. S. Arkwright, of Atlanta, Ga.; John S. Bleecker, of Columbus, Ga., and Z. V. Taylor, of Charlotte, N. C.

The president appointed George H. Wygant to serve as secretary and treasurer for the ensuing year.

In the afternoon another excursion was made around the harbor.

BOOK REVIEWS.

"The Mechanical Design and Construction of Generators." By R. Livingstone. London: The Electrician Printing and Publishing Company. Cloth, 217 pages (5¼x8½ inches), illustrated. Supplied by the Electrical Review Publishing Company, Inc., for $3.00.

This book deals with the design of dynamo-electric generators from the mechanical point of view. The author attempts to explain how the principles of mechanics may be applied to the design of these machines. It may be stated without hesitation that he has succeeded admirably, and given us a book which fills a vacant place in the literature devoted to the design of electrical machinery. In addition to much original work, it brings together in convenient form for study or reference, a great deal of information that would otherwise have to be sought in the technical journals or published proceedings of the engineering societies.

Mr. Livingstone's method of treatment is scientific, and he applies the fundamental principles of mechanics in his calculations and proofs, whenever this can be done, without introducing empirical rules and formulas; but, as every practical designer knows, it is not possible to design machinery without introducing what may be called intelligent guesswork, and the most satisfactory results are obtained, not by the highly trained physicist or mathematician, but by the engineer who combines with a sound working knowledge of the fundamental laws of nature, the almost unteachable qualification called judgment—based on experience extending over a long period of time—and the still more important, though generally underrated, faculty of imagination. The author appears to be fully alive to the fact that the mere study of books, however excellent, will not make a first-class designer; but, by giving us as far as possible the proofs or scientific reasons underlying the various formulas or rules, he raises his work to a level far above that of the ordinary handbook or pocketbook.

The subjects covered by the opening chapters include: pulleys; belts; toothed gearing; couplings; rotor hubs; the design of the end clamping plates; and the calculation of the unbalanced magnetic pull when the armature is not exactly in the center of the field system. Chapter IV deals with slow-speed bearings, and Chapter XII with the shafts and bearings of high-speed machines. These are both well written, and the treatment is good; but very little is said about ball bearings, and nothing at all about roller bearings. It is true that these special bearings would usually be purchased complete from the manufacturer; but the designer of electrical machinery should have a fair knowledge of their applicability or otherwise; also of their size, cost, and efficiency. The reviewer thinks that two or three pages might with advantage be devoted to a discussion of the advantages and limitations of roller bearings as applied to electrical machines: he has in mind the type of bearing made by the Hyatt Roller Bearing Company, in which the flexibility of the rollers is a commendable feature of the design.

Chapter V, which relates to the alinement of shafts, is one of the most interesting in the book. The advantages to be derived by setting three bearings out of alinement, and the methods of calculating the amount of displacement of the central bearing, are very clearly explained. The remaining chapters in the book deal with the design of stator frames, stresses in high-speed rotors, methods of securing poles and field coils, together with general details, such as shaft, keys, press fits between rotor bodies and shafts, and balancing of rotating parts. The volume contains many good illustrations, including several showing the construction of modern high-speed rotors.

A. STILL.

"Switches and Switch Gear." By R. Edler. Translated by Ph. Laubach. New York: D. Van Nostrand Company. Cloth. 400 pages (5½x8¾ inches), 370 illustrations. Supplied by Electrical Review Publishing Company, Inc., for $4.00.

This volume treats principally of the factory design of switching equipment. It is a translation of a book of the same title printed in German. Professor Edler, the author, is connected with the Technologisches Gewerbe Museum, at Vienna, Austria. Mr. Laubach is manager of the switch gear and instrument department of the Electrical Engineering & Equipment Company, London. Both of these gentlemen are specialists, and have produced a work that should be of considerable value, not only to designers but also to users of switch equipment. As might be inferred, the volume treats more particularly of the proportions and construction of the devices than it does of their application in central-station practice. Continental practices and apparatus are described; but in spite of this, most of the matter in the book should be of interest and value to the American reader. There are nine chapters.

Chapter I, "General Remarks on the Design of Switchgear," considers certain elements that must be recognized when designing equipment.

Chapter II, "Connecting Leads—Cable Sockets—Connectors—Copper Bars—Contact Blocks—Bolts," gives a very thorough treatment of these components. Equations are included whereby proper proportions, from mechanical and current-carrying capacity standpoints, can be determined.

Chapter III, "Contact Springs and Brushes—Carbon Contacts—Devices to Eliminate Sparking at the Main Contacts," gives a practical treatment from the factory designer's standpoint of the electrical and mechanical features of these elements.

Chapter IV, "Switches and Change-Over Switches for Low Pressure and Medium Pressure," discusses the electrical and mechanical design of what we term in this country "knife switches."

In Chapter V, "High-Pressure Switches," air-brake, horn-type, and oil switches for the higher voltages are analyzed, and the electrical and mechanical principles that govern their design and operation are discussed.

Chapter VI, "Fuses," considers the design and construction of open, closed and horn-type fuses for the different commercial voltages.

Chapter VII deals with "Self-acting Switches (Automatic Switches)—Circuit-Breakers—Time Relays, etc." One piece of apparatus that is described in this chapter is of particular interest at this time to the American reader. This device is the automatic control switch or current-limiter that is being used so successfully by the Europeans in connection with their small-customer or flat-rate installations. This current-limiter, which causes the consumer's lamps to flicker by making and breaking the supply circuit if the consumer's demand exceeds that for which he is paying, is very ingeniously constructed. It is understood that the sale price in Europe is something like $1 each. No similar competitive devices have ever been developed in the Unitd States; but the demand for them exists, and they will doubtless soon be manufactured. For this reason the information given in the book should be of interest to American manufacturers.

Chapter VIII is on "Starting and Regulating Resistances—Controllers," for motors for operation on different systems and for different services.

Chapter IX is on "Accumulator Switches," and deals with the special switches required for both small and medium-sized storage-battery installations.

TERRELL CROFT.

New Buildings for Tech.

After a short halt in construction work, due to a court decision which prevented the sale of the Institute property in Boston, work has been resumed on the new buildings of the Massachusetts Institute of Technology, in Cambridge. Pouring of concrete has been completed over an acre of floor space.

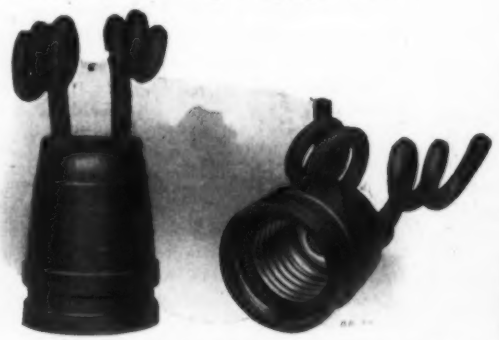
New Electrical and Mechanical Appliances

Condensite as a Molded Electrical Insulating Material.

One of the distinctive achievements in synthetic chemistry in recent years has been the series of condensation products obtained from phenol. Noteworthy among these compounds is the material known as Condensite, which is produced as the result of a reaction between phenol and formaldehyde. This material in one stage of its manufacture resembles the fine natural gums, but it has been found to possess a number of properties not found in any of these gums, and which make it peculiarly suitable for use in plastic molding.

Among these properties is the fact that it can be softened so as to be readily molded by pressure into any desired shape. When heat is further applied, however, it becomes permanently hard, so that no subsequent heating changes its shape or softens it. In this final condition it is not only infusible, but also insoluble in acids, alcohol, oils, and other well known solvents.

Ignition Distributor Caps Molded of Condensite.



Weatherproof Sockets with Condensite Body.

Another very important property possessed by this material is its high dielectric or insulating property. It does not absorb water and as a dielectric shows a strength of 400 volts per mil thickness. The material has high mechanical strength and is very hard. It takes a very fine polish and retains this finish. Its color is not changed, and it does not discolor silver or other metals. It can be sawed, cut, machined, or filed readily.

From the foregoing summary of its chief properties, it it evident that Condensite is very serviceable in making molded insulating parts of electrical apparatus. Since it can be molded with various kinds of metal inserts, it has been found very useful for a variety of electrical purposes, some of which are illustrated in the accompanying views. One of these shows a group of six cylinder distributor caps for an antomobile ignition system. The neat form of the outfit will be readily observed. This cap was molded by the Duranoid Manufacturing Company for the Atwater-Kent Manufacturing Company. Another illustration shows two views of weatherproof lamp sockets that have been extensively used by the United States Navy in place of hard rubber or other insulating materials. These were molded by the Dickinson Manufacturing Company. These sockets have been found to be stronger and freer from deterioration than hard rubber, porcelain, or other materials.

Still another illustration shows a high-voltage bushing molded by the Dickinson Manufacturing Company for use in central stations of the Commonwealth Edison Company, Chicago. The threaded portion in the middle section of this bushing has a sharp edge. The corrugated end sections serve to increase the dielectric surface between the conductor and the wall through which the bushing passes.

Special forms of Condensite are manufactured for electrical purposes necessitating requirements. This material is manufactured by the Condensite Company of America, Glen Ridge, N. J.

Prizes for Air-Brake Stories.

The sum of $2,000 in prizes has been offered by the Westinghouse Air Brake Company in several advertisements published in various railway technical papers during the last few months.

The company stated that it would pay this sum of money for the six best articles or stories submitted, under certain conditions, dealing with the experience and practical knowledge of railroad employees regarding any striking performance of the air brake manufactured by the company.

The history of braking railroad trains is full of dramatic but unwritten narrative and the company believes that by offering this incentive a vast amount of this material will be brought to light.

High-Tension Bushing Made of Condensite.

The conditions stated that the story must be written either from the practical experience or the personal observation of the writer, or from information obtained first hand from railroad men who actually knew the facts related.

The contest closed August 1, 1914, and the committee of judges composed of the following men is now engaged in judging the entries: W. E. Symons, consulting mechanical engineer, Chicago; Willard Smith, editor, *Railway*

Review, Chicago; R. V. Wright, managing editor, *Railway Age Gazette,* New York City.

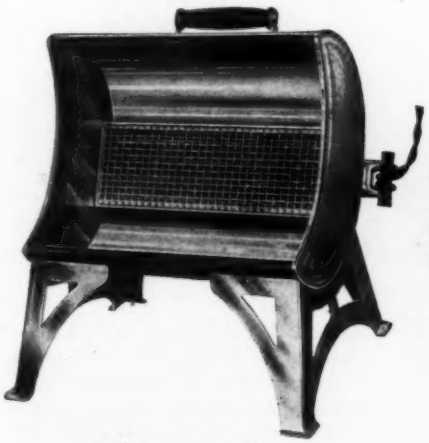
Very considerable interest was displayed in the contest and a large number of stories were submitted so that several weeks will elapse before the judges will be able to announce the winners of the prizes.

El Radio, A New Luminous Air Heater.

A new luminous heater, known as El Radio, and of the glowing-coil-and-reflector type, is being manufactured by the Hotpoint Electric Heating Company, Ontario, Cal.

It is not intended to take the place of a coal or wood stove or furnace, but it serves very well for warming bathrooms, small offices and other small rooms, or to take the chill off larger rooms.

The heater consumes 600 watts, therefore can be attached to any lighting circuit. It is equipped with a cord, attachment plug and interchangeable switch-plug, which can be used on other Hotpoint appliances.



El Radio Air Heater.

This crescent-shaped electric heater is formed of pressed steel, the outside is finished in polished nickel, with back of body in dull black, and the inside is polished copper, lacquered to prevent tarnishing.

It takes up only 10 by 12 inches of floor space and the height over all is 12 inches. A weight of only four pounds, and a wood handle at the top, make this little electric grate conveniently portable.

The cherry-red glow of the coils produces a very pleasant effect and avoids the glare due to lamp-type electric radiators. The new electric heater is absolutely sanitary and does away with the vitiation of the air, noxious odor and positive danger attendant on the use of gas or oil heaters.

Commutator Test of U. S. L. Starter and Lighter.

To find out the actual as well as the relative strength of automobile starter and lighter commutators, the United States Light & Heating Company, Niagara Falls, N. Y., recently carried on several tests. The last commutator tested gave by far the best results. This commutator with Bakelite molded insulation proved practically indestructible; it was speeded up to 9,060 revolutions per minute, or 24,600 feet per minute peripheral speed, before going to pieces. As the maximum speed at which such a commutator would be operated in service is only 3,500 revolutions per minute, the factor of safety in the above instance would be 6.7, since the force tending to break the commutator varies as the square of the speed.

It is interesting to compare this test with the previous tests made by this company on commutators made up of brass and steel rings with mica between rings and bars. These constructions proved inferior to the Bakelite-insulated commutators for the brass commutator went to pieces at 6,000 revolutions, while the steel commutator would stand only approximately 8,000 revolutions. In commenting on these tests the engineers in charge say that "the tests show conclusively that the reinforced Bakelite construction is far superior to anything on the market today with regard to the actual strength of the commutator." They further say that it is apparent that the Bakelite commutators they are furnishing on their starting equipments are practically indestructible.

Since this test was made there has been a slight change made in the design so that the United States Light & Heating Company is of the opinion that its Bakelite commutators will stand 10,000 revolutions per minute.

Commutator with Bakelite Insulation.

The type of commutator tested is shown in the accompanying illustrations, the sections showing the construction of copper segments, steel rings, and Bakelite insulation. The commutator complete weighs 8.46 pounds and has an outside diameter over the tangs of 13.375 inches. When tested, the tangs were removed so that the commutator then weighed 7.06 pounds and had an outside diameter of 10.375 inches. This is the diameter at the commutator face.

In order that the commutator, while being tested, would approach service conditions as to temperature, it was heated up to 265 degrees Fahrenheit before testing, this temperature being higher than would occur in service. Calculations show that the disrupting forces, that is, the force tending to pull the commutator apart, was 15,230 pounds per square inch. As this was resisted by the tensile strength of the steel rings and Bakelite molded insulation, the holding power of the Bakelite and steel rings is evidently equal to this figure.

In addition to having such high tensile strength for commutator insulation, Bakelite possesses other qualifications; it has high dielectric strength, will not soften under heat up to at least 400 degrees Fahrenheit, and is impervious to oil and moisture.

Details of Commutator.

Splendid Picnic for Robbins & Myers' Employees.

The annual picnic of the employees of the Robbins & Myers Company, Springfield, O., was held Saturday, August 8, and was pronounced the most successful industrial event of this kind ever held in Springfield.

Between 1,500 and 2,000 employees marched in the parade which was held in the city before the picnickers left for the outing grounds. The marchers were lined up four abreast with a space of about five feet between each set of fours. The length of the parade was such that it took about 35 minutes for it to pass a given point.

The men all wore white duck trousers, white shirts, white hats, white shoes and gold ties. The girls wore white dresses with long gold sashes. The long column of white with the gold splashes from the ties of the men and the sashes of the girls, representing the company colors, made the parade one of the most attractive as well as spectacular parades ever held in that section of Ohio.

The parade was escorted through the downtown sections of the city by the chief of police and a body of patrolmen. Immediately following came the officers of the company, the Springfield Cadet Band and the out-of-town visitors. Next came the branch managers of the company, all of whom attended the picnic. The office force, engineers, a second band and the factory employees grouped by departments followed in the order named.

All along the line of march the Springfield merchants had special decorations before their stores, many of which included special displays of Robbins & Myers fans and motors. This evidence of interest in the event by the local merchants was greeted by the marchers with cheers for the merchants followed by the Robbins & Myers yells.

The line of march ended at the station of the Ohio Electric Company where 40 extra interurban cars, drawn from the companys various lines throughout the state, were waiting to carry the marchers to the picnic grounds at Tecumseh Park. Several trips by these cars were necessary to take the entire crowd to the park, the total attendance being between 4,000 and 5,000.

The fare to and from the park was paid for all by the Robbins & Myers Company, and special express cars were provided to carry the picnic baskets. A committee at the grounds saw that the baskets were all delivered to the proper persons when called for.

At the grounds light refreshments were served to all at the company's expense. Everyone had all he or she wanted. A hospital tent, with a physician and trained nurses in attendance, was provided to look after the overworked "Tummies" of any of the little folks who partook too freely of the good things which confronted them on every hand.

The consumption of refreshments furnished by the company was as follows: 1,000 gallons of lemonade, 350 gallons of ice cream and 5,000 ice-cream cones, 10,000 bags of peanuts and pop corn, 5,000 cigars, 2,000 gallons of bottled spring water.

Thirty sanitary water coolers were distributed throughout the grounds and 10,000 sanitary drinking cups were supplied.

At the grounds, entertainment was provided by a series of athletic contests and music by Hawken's Cadet Band. Cash prizes were given the winners in all of the contests and all the events were run off as scheduled on the program. A baseball game between the general offices and factory resulted in a victory for the office by the score of 8 to 7. Other events were the usual dashes, potato races, sack races, nail-driving contest, ladies' tug of war, etc. A large number was entered in each event and all events were closely contested.

The crowning event of the day and the last on the program was a tug of war between mechanical and electrical men of the factory. Ten of the strongest men in each department, captained by the superintendents of the two divisions, were entered in the contest. These men had been training for the event for several weeks and a great deal of interest was shown in the outcome by everyone in the city of Springfield. Thousands crowded along the bank of Mad River to watch the contest, and as anticipated by everyone, a battle royal was witnessed when the twenty physical giants attempted to pull each other in the pool of water across which the rope was stretched. After a long, hard pull the mechanicals finally succeeded in pulling the eletricals into the pool amidst the cheers of their followers.

Motion-picture machines from Columbus and Cincinnati were sent to Springfield to get the parade and athletic events into motion pictures, so great was the popular interest in the event throughout that section of the state. Many fine films were obtained by the motion-picture men and through the picture houses everyone in the section had an opportunity to witness the spectacular features of what the picture men claim to be the most interesting reel they have ever obtained of a large industrial concern at play.

To make this affair the success it was, many thousands of dollars were expended by the company and weeks of hard work were put in by the various committees in charge of the plans. It is felt, however, that it was time and money well spent because of the good effect it had on the employees in fostering company spirit and bringing the various departments of the office and factory in closer personal touch with each other.

The effect on the city of Springfield, too, is one which cannot be overlooked. At a time when general business conditions are such that many of the city's large industrial plants are running below normal capacity it was indeed an inspiring sight for the local citizens and merchants to see this large body of prosperous happy employees of the city's most important industry celebrating their annual holiday.

Panoramic View of Over 4,000 Attendants at Robbins & Myers Employees' Picnic.

Quarter Century Club of General Electric Company Employees.

The recently established Quarter Century Club of the General Electric Company is one of the most unusual organizations in the industrial world. On August 18 the Schenectady, N. Y., branch was organized with 150 members and the officers duly elected as follows: president, A. L. Rohrer; vice-president, John Riddell; secretary, F. J. Arthur; treasurer, H. W. Leland; trustees, John Waldron, E. S. Beyer, D. O. Youlen.

The sentiment of the club is best expressed by President A. L. Rohrer: "We are here as men who have both given and received much from the company we have served. A mutual interest of enduring character holds us to a still useful future."

New applications are being received as fast as the 25-year service period is completed. Many others will become eligible for membership between now and January 1, 1915.

The oldest members of the Quarter Century Club, in point of service, began work for the company about 1880. Several have completed service periods of more than 30 years. It is interesting to find among the men who compose the membership, that over

one-third of the number having had business association with the company for 25 or more years, are under 50 years of age. Two are recorded as being under forty.

The Thomson Quarter Century Club of the Lynn Works is the oldest of such organizations in the General Electric Company, and has a membership of over 150.

Throughout the general and district offices of the company, 50 or more others have also completed a 25-year service period. Including all now employed in various organizations of the General Electric Company, the number of men in the quarter-century group shows a total of about 400.

Boltless Cable and Strain Clamps.

In high-tension overhead construction, especially that involving heavy conductors, the proper holding of cables requires clamps of special construction. Usually these have been provided with various bolts and take-up devices which necessitate considerable additional labor in their installation. To overcome this difficulty the Automatic Cable Clamp Company, of Donora, Pa, has placed on the market some clamps appropriately called automatic, because they are free from bolts and can be readily applied.

A self-tightening cable clamp is shown in Fig. 1. This is used for dead-ending and supporting power cables. An ingenious lever construction used in this clamp permits the cable to be gripped with a force which varies directly as the tension is applied. The clamp is attached very speedily, since it requires no bolts, wedges, or other devices. It can be very quickly removed when the tension is released. When applied for the purpose of dead-ending power cables the insulation of the cable is removed for about five inches; the clamp is then attached without soldering or other time-consuming methods. This clamp has been particularly suitable in making sharp turns in heavy cables, and in other locations where difficult cable suspensions would be required without the use of a convenient clamp, such as the one shown. The clamp has been tested so that the makers rate it to withstand safely strains of 10,000 pounds for cables having a cross-section of 250,000 to 1,000,000 circular mils.

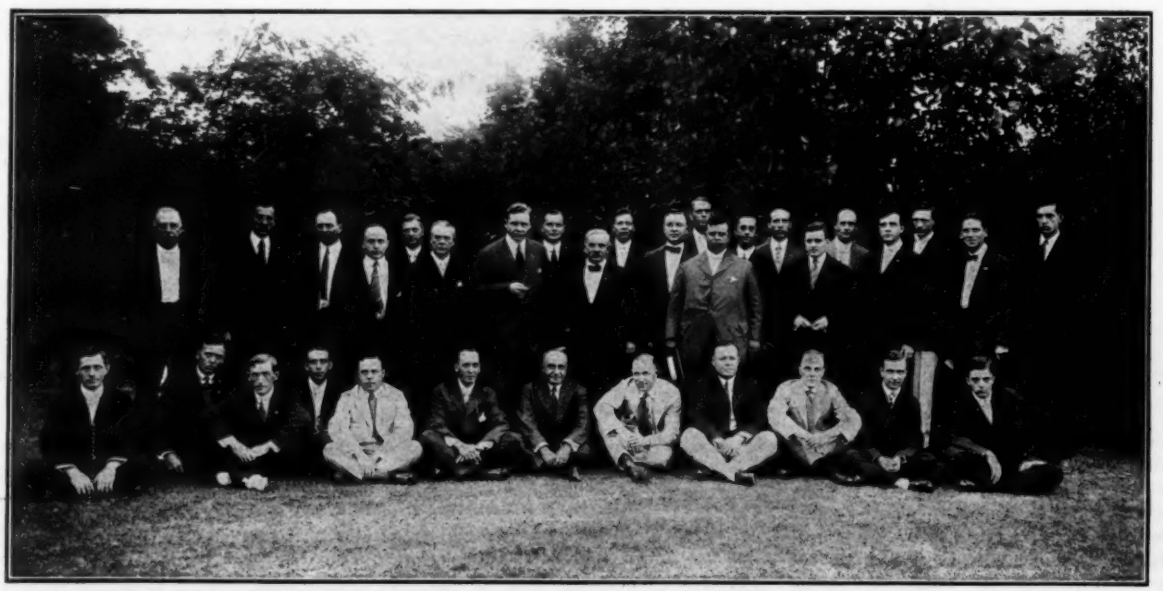
In Fig. 2 is shown a boltless automatic strain clamp which consists of only three pieces. As soon as attached the clamp takes up any strain applied and its clamping power increases directly as the strain. The clamp does not slip under any strain and does not lose its grip until the cable itself breaks. Kinking of the strain cable is avoided because the gripping area of the clamp is lengthwise of the cable, and the eyelet at the dead end of the outfit is very close to the axis of the cable itself. This clamp is made for cables ranging from No. 2 up to the No. 0000 size, and is suitable for either solid or stranded cables. It is designed especially for dead-ending at strain towers, for anchoring near the walls of power houses, for guying sharp turns in transmission lines, for holding jumpers, for catenary construction of railway lines, and other overhead work. By giving the clamps a sherardized surface they are rendered rustproof.

Fig. 1.—Self-Tightening Cable Clamp.

Fig. 2.—Boltless Automatic Strain Clamp.

Convention of Federal Organization.

The fifth annual convention of the executives, department heads, and branch-office managers of the Federal Sign System (Electric), Chicago, was held at the Moraine Hotel, Highland



Group at Annual Conference of Federal Sign System Executives.

Park, Ill., August 5 to 7. The entire time at the convention was given over to discussions of papers and other affairs relating to the company's business, products and interests. The convention was said to be the most successful so far held by this organization. The accompanying illustration shows the delegates assembled on the hotel lawn on the closing day.

New Weston Instrument Transformers.

A new line of switchboard and portable instrument transformers of an exceptionally high order of merit has been placed on the market by the Weston Electrical Instrument Company, Newark, N. J. It has long been recognized that instrument transformers should be designed and made with a much greater degree of refinement than is necessary in commercial lighting and power transformers and, as might have been anticipated, these new contributions to the art of electrical measurement by the Weston company are worthy of recognition as standards of excellence.

Portable Instrument Transformer with Self-Contained Primary Windings.

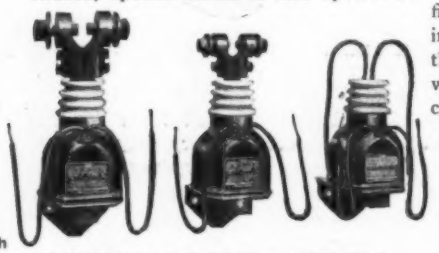
Portable Instrument Transformer, Inserted-Primary Type.

They represent the results of several years' careful and most thorough analytical study and experimental investigation of the many factors involved in developing and making instrument transformers capable of giving the highest degree of precision under the widely varying conditions incidental to their practical use.

Two different models of portable current transformer are made. One type has three self-contained primary windings and the other is of the inserted primary type, the ratio depending upon the number of turns of the primary that are passed through the aperture. There is also a portable potential transformer, which is made in various ranges.

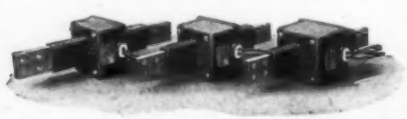
The switchboard models are made in several different types, which vary in appearance with the ratio, with the volt-ampere capacity, and with the potential of the circuit.

The manufacturer emphatically claims that these transformers are unequalled in precision, in design, in workmanship and reliability in service. Indeed, special stress is laid upon the accuracy of the ratios of transformation, and upon the fact that the design and proportions of the transformers are such that it is unnecessary to have instruments specially calibrated with the transformers in order to obtain the degree of accuracy to which high-grade instruments are guaranteed when used without transformers.



Switchboard Instrument Transformers.

This feature is of special interest in connection with tests with portable instruments, because in many quarters the impression has prevailed that no transformers could be made that would assure the users of the degree of accuracy for which a high-grade portable instrument is designed, unless special precaution had been taken to calibrate a particular instrument with a particular transformer.



Switchboard Current Transformers.

A New Separable Attachment Plug.

To meet the growing demand for a separable attachment plug of durable construction, the Manhattan Electrical Supply Company, 17 Park Place, New York City, has recently placed on the market a new plug of this character, the general arrangement of which is well shown by the accompanying illustrations.

This plug is made of special black molded insulating material having high dielectric and mechanical strength. It is smoothly finished and has the appearance of hard rubber. It is very tough and stands severe usage, thus making it greatly superior to the easily breakable porcelain. Ample space is provided in the cap to permit knotting the cord securely. The terminals in the cap are of heavy brass and when inserted into the body of the plug have a strong rubbing contact. The contacts within the body are so arranged that it is impossible to short-circuit the plug with a hairpin or similar device.

The separable feature permits attaching the body of the plug to a fixture or other outlet without twisting the extension cord. The cap is then merely pushed in place. Likewise in removing the plug the cap can be first pulled off and then the body of the plug unscrewed. This feature also prevents a strain on the cord from causing damage to the fixture or to any appliance connected therewith.

Separable Plug.

Foreign Patents.

Owing to frequent recent inquiries as to the patentability in this country of an invention already patented abroad, the United States Patent Office wishes to give special publicity to its rule on this subject, which is as follows:

Rule 29. The receipt of letters patent from a foreign government will not prevent the inventor from obtaining a patent in the United States, unless the application on which the foreign patent was granted was filed more than twelve months prior to the filing of the application in this country, in which case no patent shall be granted in this country.

The Japanese Government proposes to secure national control of all water-power undertakings in Japan in order to regulate waterway improvements.

Latest Approved Fittings

CABINETS.—The J. Lang Electric Company, 423 North Lincoln Street, Chicago, Ill.

"Lang" panelboard cabinet, steel. Style HW.

Commercial products of this class which are regularly examined and tested under the supervision of the Underwriters' Laboratories at the factories where they are produced bear uniform labels.

Approved July 23, 1914.

CONDUIT BOXES, Floor Outlet.—Steel City Electric Company, 1207 Washington Avenue, Pittsburgh, Pa.

"Fullman" watertight floor outlet boxes, adjustable and non-adjustable types.

Non-adjustable, catalog No. 477.

Adjustable, catalog Nos. 402, 403, 404, 422. Also gang boxes, catalog Nos. 448 to 452 inclusive, with adjusting frame for leveling the cover of the box.

All the above with brass cover plates and outlet nozzles.

Approved July 22, 1914.

CURRENT TAPS.—H. T. Paiste Company, Thirty-second and Arch Streets, Philadelphia, Pa.

Current tap, 660 watts, 250 volts.

Multiple type, catalog No. 410. (See cut.)

Current Tap.—H. T. Paiste Company.

Where, in addition to sockets or receptacles already installed, connections are desired on lighting circuits for portable lamps or for other special appliances requiring only small amounts of current, multiple current taps may be used, provided the total energy required in the circuits to which they are connected does not exceed 660 watts, and provided their use does not under any condition overload the socket or receptacle with which they are used or cause a departure from the requirements of Rule 23*d* of the National Electrical Code.

Approved June 30, 1914.

FASTENERS.—Chicago Fuse Manufacturing Company, 1014 West Congress Street, Chicago, Ill.

Type L fasteners for securing flexible tubing in switch and outlet boxes, consisting of coppered steel rings formed to engage edges of holes in boxes and having teeth to grip 7-32, 2-8, 1-4 and 5-16 inch tubing. (See cut.)

Approved August 4, 1914.

The electrical fittings illustrated and described in this department have been approved by the Underwriters' Laboratories, Incorporated, following examination and tests conducted under standards of the National Electrical Code as recommended by the National Fire Protection Association.

PICTURE MACHINES AND APPLIANCES.—George J. Gilmore, 704 Wells Street, Chicago, Ill.

"Gilmore" storage box for films.

A sheet-metal box having three compartments designed to accommodate a 1000-foot reel of film in each compartment.

Approved July 22, 1914.

RECEPTACLES, for Attachment Plugs.—Chapman & Walker, Limited, Toronto, Can.

Flush plug receptacle, 660 watts, 250 volts, catalog No. A-922.

Approved June 30, 1914.

RECEPTACLES, Standard.—The Bryant Electric Company, Bridgeport, Conn.

"Bryant" porcelain-shell.

Keyless, 1,500 watts, 250 volts.

Cleat, catalog No. 4073.

Approved July 11, 1914.

RECTIFIER PANEL.—Electric Products Company, 10,514 Dupont Avenue, Cleveland, O.

"Wotton" automatic battery-charging panel for use with Wotton rotary rectifiers, types R-20, R-30, R-45, RE-20, RE-30, RE-45, RR-20, RR-30, RR-45, RRE-20, RRE-30, RRE-45.

Standard when installed with protective devices in accordance with the Class C requirements of the National Electrical Code.

Approved July 22, 1914.

RHEOSTATS.—Fairbanks-Morse Electrical Manufacturing Company, Indianapolis, Ind.

Type CCR starters for alternating-current motors, 5-20 horsepower, 110-550 volts.

Oil-immersed switches and resistance units mounted in metal cases. In the "off" position the switch disconnects motor and resistance windings from the line.

Approved July 27, 1914.

SWITCHES, Push-Button Flush.—The Connecticut Electric Manufacturing Company, Bridgeport Conn,

Double-pole, 10 amperes, 250 volts.

Three-way, five amperes, 250 volts, 10 amperes, 125 volts.

Approved August 1, 1914.

SWITCHES, Push-Button Flush.—Independent Electrical Supply Company, 59 Warren Street, New York, N. Y.

Single-pole, five amperes, 250 volts. 10 amperes, 125 volts, catalog No. 591.

Single-pole, five amperes, 250 volts, catalog No. 592.

Three-way, five amperes, 250 volts. 10 amperes, 125 volts, catalog No. 593.

Approved July 10, 1914.

SWITCHES, Surface Snap.—The Bryant Electric Company, Bridgeport, Conn.

Surface snap switches shown by tests and examinations conducted by Underwriters' Laboratories to be in accordance with requirements of the National Board of Fire Underwriters have labels attached to each device.

Approved July 24, 1914.

THEATER APPLIANCES.—A. G. Electric & Manufacturing Company, 905 Howard Avenue, North, Seattle, Wash.

"A. G." stage receptacle and plug. 60 amperes, 125 volts.

This device consists of a receptacle mounted on a slate base, and a fiber plug, for use in approved cabinets supplied by the manufacturer.

Approved June 30, 1914.

THERMOSTAT-CONTROL OF ELECTRIC CAR HEATERS.—Railway Utility Company, 226 South La Salle Street, Chicago, Ill.

"Utility" thermometer control of electric car heaters, consisting of an electromagnetically operated, 50-ampere, 550-volt switch controlled by contacts in a mercury thermometer and relay, is obtained from taps on a shunt circuit. All operating parts are inclosed in a metal case.

Fastener.—Chicago Fuse Manufacturing Company.

This system is judged to be suitable for use when wiring is installed in accordance with Rule 40 of the National Electrical Code.

Approved June 30, 1914.

WIRES, Rubber-Covered.—New York Insulated Wire Company, 114 Liberty Street, New York, N. Y.

Marking: Two black threads woven into the braid, crossing each other, or one black thread woven into the braid, or for white and colored braided wire, an oak thread under braid parallel to conductor.

Rubber-covered wire shown by tests and examinations conducted by Underwriters' Laboratories to be in accordance with requirements of the National Board of Fire Underwriters, have labels attached.

Approved July 22, 1914.

Current Electrical News

NORTH ATLANTIC STATES.

PORTLAND, ME.—The American Rotary Power Company has been incorporated to deal in patents, licenses, manufacture and deal in machinery and power plants for purpose of generating electricity for light, heat and power. The capital stock is $1,000,000. Benjamin Thompson is president and Daniel J. Reardon and Frederick Pennell are named among the incorporators.

PORTLAND, ME.—Royal River Manufacturing & Power Company has been organized and papers of incorporation filed. The purpose of the company is to generate and otherwise acquire, and to supply electric or other power for public or private use. The capital is $150,000 and the incorporators are J. Tannor of New York City, who is president, and Philip F. Nestel of Cresskill, N. Y.

HARRISVILLE, N. H.—At a special town meeting in Harrisville it was voted to light the streets of the village by electricity.

CHICOPEE, MASS.—A new ornamental system of street lighting is to be installed on Market Square in this city. Incandescent lamps in round globes, arranged in clusters, will be installed on tall standards. The city appropriated $10,000 for the new system. This will cover only a part of the work planned. The completion of the scheme will follow in another year. W.

SPRINGFIELD, MASS. — The United Electric Light Company has added to its power load the Powers Paper Company, whose mill is at Brightwood, a suburb of Springfield. This concern will use 150 horsepower in motors. W.

GLOUCESTER, N. J.—Councilman Lewis B. Reilly, Borough Council, is interested in a plan to install a municipal electric lighting plant at the city waterworks. A.

PERTH AMBOY, N. J.—The Board of Aldermen has adopted a resolution providing for a vote of the citizens, at the next general election, on the proposed municipal electric lighting plant. The plant is estimated to cost $125,000. A.

PLAINFIELD, N. J.—The Commonwealth Water & Light Company has made application for a fifty-year franchise in Warren Township. The company has been awarded a contract for one hundred new street lamps in this section. A.

ROSELAND, N. J.—The Borough Council is negotiating with the Public Service Electric Company for the extension of its system along Eagle Rock Avenue. A street-lighting system on this thoroughfare is also planned. A.

TRENTON, N. J.—The Board of Public Utility Commissioners has granted permission to the Riverside Traction Company to issue $51,000 of five-per-cent mortgage bonds for the erection of a new power plant at Burlington.

CALIFORNIA, PA.—A state charter has been granted to the Monongahela Southern Traction Company, having a capitalization of $108,000, to build a line from this place to Brownsville, Pa.

COLUMBIA, PA.—Sealed proposals for electrically lighting the streets of this city for a period of five years from October 1 will be received by the undersigned until September 1. The contracting company shall furnish all poles, wires, lamps, machinery, etc. Address all bids to the chairman, John P. Myers, 526 Union Street, Columbia, Pa.

FREEMANSBURG, PA.—The Freemansburg Electric Light & Power Company was granted a franchise to build a plant to provide street lighting for a period of five years.

LEWISTOWN, PA.—The Borough Council has adopted an ordinance putting the proposition of a $70,000 loan for the erection of a municipal light plant to the citizens.

PHILADELPHIA, PA.—Universal Conduit Manufacturing Company has been incorporated to install electric wiring and other device systems. The capital stock is $300,000 and the incorporators are F. R. Hansell, Philadelphia, Pa., and G. H. B. Martin, of Camden, N. J.

PITTSBURGH, PA.—It is rumored that the Market Street Businessmen's Association has under consideration procuring their own lighting facilities for a "Great White Way."

PITTSBURGH, PA.—Application for Pennsylvania charters of incorporation for the Waterford Township Power Company, the Concord Township Power Company, the Union Township Power Company and the Wayne Township Power Company will be made by Fred B. Hofft, F. Milward Oliver and Charles H. English. The new concerns will supply electric light, heat and power to the public of the townships for which they are named. N.

WAYNESBORO, PA.—The Frederick & Brunswick Railway Company has been incorporated with a capitalization of $100,000 for the purpose of building a trolley line from Jefferson to Brunswick. Work is to commence by November 1, this year, and be completed and ready for operation by June 1, next.

SOUTH ATLANTIC STATES.

CHARLESTOWN, W. VA.—Max Frankenberger, J. S. Hill, A. Schwab, George F. Coyle, B. A. Wise and J. C. Morrison were appointed as a special committee to solicit the money necessary to the installation of the proposed white way.

CHATHAM, VA. — Pittsylvania Power Company of Chatham, Va., has been incorporated with a capital stock of $550,000 to take over the plant on the Banister River at White Falls. Two units of 375-horsepower capacity each will be installed and pits built for the installation of two additional units of the same size when required.

CHARLOTTE, N. C.—Southern Bell Telephone Company is reported as contemplating expending $40,000 to lay underground conduits.

FLORENCE, S. C.—The Carolina Central Electric Company has been incorporated with a capital of $5,000 by D. T. McKeithan and others.

ROCKMART, GA.—The issuance of $5,000 of municipal bonds for purchasing and installing additional machinery in the electric light plant has been voted. Address the mayor for particulars.

PABLO BEACH, FLA.—An election will be held September 1 upon the issuance of $35,000 of municipal bonds, of which it is proposed to use $10,000 for establishing an electric light plant. Plans have been prepared by the J. B. McCrary Company, Third National Bank Building, Atlanta, Ga.

NORTH CENTRAL STATES.

BLANCHESTER, O.—The village of Blanchester will on September 7 sell a bond issue of $5,000, the proceeds of which will be used in the construction of an electric plant for municipal operation of electric lights. L.

DEGRAFF, O.—The town authorities are planning the reconstruction of the various buildings destroyed by the recent fire, and the construction of a new electric-light plant. Work will be rushed as rapidly as possible as soon as financial arrangements can be made and contracts let. Address the mayor for desired information. L.

HAMILTON, O.—The city is contemplating the construction this fall of a municipal electric plant, to be operated in connection with and by power furnished by the waterworks plant which is to be reconstructed. Definite plans have not yet been announced, as the waterworks improvements have not been fully decided upon. L.

LOVELAND, O.—The Loveland Light & Water Company has been incorporated with a capital of $50,000 by Stanley Matthews, and others. The company was formed to take over and reorganize the light and water plant at Loveland, O., which is now in the hands of the receiver.

UPPER SANDUSKY, O. — The Council is negotiating to secure improved lighting. A. H. Owen is president of the Council.

PINCONNING, MICH.—J. J. Thorne has purchased the property of the Pinconning Light & Power Company and improvements will be made.

ABLEMAN, WIS.—An electric light system will be installed here. Address the town clerk.

GREEN BAY, WIS.—The Wisconsin Public Service Company will soon begin an extension of its line on East Mason Street. Humphrey Krebs, general foreman of Columbia Construction Company, is in charge of the work.

SPARTA, WIS.—Ed Hatch is planning the extension of the electric light system.

LUVERNE, MINN.—$20,000 may be expended to improve the electric power house. Address the city clerk in regard to this improvement.

NORTH MANKATO, MINN.—The town is contemplating installing an electric lighting system. Address H. E. Clayton, village clerk, for further information.

ST. PAUL, MINN.—Plans are being prepared for a municipal electric light and power plant, also improvements to the pumping plant.

ALVORD, IOWA.—The City has voted a bond issue for an electric municipal light plant. Address the city clerk for information.

LE MARS, IOWA.—The Council is planning ways and means to install a $10,000 light and water system. Address the town clerk for further data.

JENNINGS, MO.—Jennings and Woodlawn, towns northwest of St. Louis, expect to have their streets illuminated with sixty-six electric lamps before winter. The Improvement Associations of those places have had the matter under consideration for several weeks.

JOPLIN, MO.—A 400-ton electrically driven mill will be installed by October 15 on a 20-acre lease on the Connor tract south of Carterville; the two air compressors, the mill machinery, the hoist and the sludge department will be run by motors, at least five motors in all.

WEBB CITY, MO.—The City Council wants to establish a "White Way" in the business district, and is considering replacing the arc lamps with something else not decided upon.

McINTOSH, S. D.—$6,000 has been voted for a municipal lighting plant. Bids for the construction of the plant will be advertised at once.

WESSINGTON SPRINGS, S. D.—The Council will construct a $20,000 lighting system. Address the town clerk in regard to this improvement.

DE WITT, NEB.—The Council plans to expend $15,000 for a municipal lighting plant. Address the city clerk for information.

SOUTH CENTRAL STATES.

LOUISVILLE, KY.—Motor-generator sets amounting to a total of 55 horsepower will be installed in the garage which the Electric Garage Company is equipping here, according to the terms of a contract signed with the Louisville Gas & Electric Company. This will rank as the largest vehicle battery charging plant in the city.

CHATTANOOGA, TENN.—Chattanooga-Tennessee River Power Company proposes changes at Hales Bar hydro-electric plant to cover the installation of three 10,000-kilowatt transformers.

MASON, TENN.—Mason Telephone Company has been incorporated with a capital of $2,000 by John T. Karnet and others.

EUFAULA, ALA.—The Columbia River Power Company will biuld and operate an electric light plant at Columbia, south of this city. Address J. E. Foy, of Eufaula, for further information.

FLORENCE, ALA.—The West Florence Corporation is now being organized with a capital stock of $1,000,000 to develop Cypress Creek water power. Col. N. Thompson, Birmingham, Ala., is interested.

ARGENTA, ARK.—City Attorney Fred McDonald recently made negotiations for the city of Argenta for the issue of warrants amounting to $30,000. This bond issue will be made to enable the city to extend the "White Way" on East Washington Street from Poplar Street to Pine Street.

DALLAS, TEX.—The Texas Power & Light Company of this city will improve and enlarge the McKinney electric plant. Address the secretary.

GALVESTON, TEX.—Lawrence Electric Company has been granted articles of incorporation, capitalized at $10,000. The incorporators are David T. H. and A. S. J. Lawrence.

LOCKHART, TEX.--It is announced that construction of the Central Railway of Texas will soon be started. Preliminary arrangements for the project are nearly finished. The proposed road will run between Rockport, on the Gulf Coast, and Belton. It will touch the towns of Goliad, Yorktown, Sample, Belmont, Fentress Prairie Lee, Lockhart, Lytton Springs and Jarrell. The route is through a highly developed agricultural region that will afford a large freight tonnage from the very beginning. The line will be about 350 miles long.

PARIS, TEX.—The Texas Power & Light Company will build an electric power station. Address the secretary for information.

WESTERN STATES.

LEWISTOWN, MONT.—Polmar Electric Company of Lewistown has been incorporated by Ray R. Polson, W. J. Dittmar and Harry A. Polson, all of Lewistown. The capital is $10,000.

LEWISTON, IDAHO. — The City Council has authorized the employment of James Morris, engineer, of Portland, Ore., to secure preliminary data relative to the construction of a municipal light and power plant on the Clearwater River. O.

PLUMMER, IDAHO. — Dunkle Brothers, here, have been granted a certificate of public convenience and necessity by the Public Service Commission and will immediately begin the construction of a light and power plant to furnish this city and nearby territory with current for light and power. It is understood sufficient capital has been raised to insure immediate start of construction. O.

CATHLAMET, WASH.—The installation of a municipal light plant is being considered by the City Council. The Pacific States Electric Company and the General Electric Company, both of Portland, have been asked to submit preliminary estimates on the cost of constructing this utility. The Council will call a special election to vote on the proposition as soon as the estimates are filed. O.

SOUTH BEND, WASH.—A franchise has been granted the Willapa Harbor Power Company to serve several townships in Pacific County.

DRAIN, ORE.—The City Council at a recent meeting granted a franchise to enter this city with electric transmission lines to the Douglas County Light & Water Company. A contract between this city and the company has been signed, the corporation agreeing to be ready for operation by February 1 next. The contract for the installation of the local distributing system has been let to John W. Hogg, of Sutherlin. The transmission lines will be extended from Oakland north to Drain, to supply energy. O.

PORTLAND, ORE. — The Pacific Telephone & Telegraph Company is preparing to string an additional copper circuit between this city and Seattle. This circuit will consist of two copper wires, each weighing 435 pounds per mile, or an aggregate of 156,000 pounds of copper wire. In order to make ready for this several other lighter copper circuits between different points on the line will be strung. The preliminary work will cost about $35,000. O.

COLUSA, CAL.—Bids will be received up to September 10 for maintaining lights in the Princeton lighting district.

FRESNO, CAL.—An arrangement has been tentatively agreed upon to cancel the $45,600 contract for the installation of the down-town electrolier street-lighting system and substitute for it another under a new call for bids. Address City Attorney Lewis H. Smith in regard to the matter.

SAN JOSE, CAL.—Bids will be received until September 8 for the highway lighting of the Willow Glen lighting district.

CORDOVA, ALASKA. — Harry Knox, here, recently petitioned the City Council for a franchise to construct and operate a light and power plant in this city. O.

PROPOSALS.

ELECTRIC LIGHT PLANT.—Bids will be received until September 30 for the construction of an electric light plant for Bay Minette, Ala. Address W. D. Stapleton, mayor.

ELECTRICAL WORK.—Bids are being asked for the electrical work necessary in the Brashear, Eats Street, Larimer and Osceola schools, of Pittsburgh, Pa. Address the Office of the Superintendent of Buildings, 735 Fulton Building, Pittsburgh, Pa. N.

ELECTRIC DRILLS.—Sealed proposals will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until September 15 for furnishing 15 portable electric hand drills, 125 volts, 5-inch, to have two speeds, as per Schedule 7218, for delivery at the Navy Yard, Brooklyn, N. Y.

INTERIOR LIGHTING FIXTURES.—Sealed proposals will be received at the office of the Supervising Architect, Washington, D. C., until September 28 for the interior lighting fixtures of a three-story building for the post office at Amarillo, Tex., in accordance with drawings and specifications, copies of which may be obtained either from the custodian of the site or the office of the Supervising Architect.

ELECTRIC PASSENGER ELEVATOR.—Sealed proposals will be received at the office of the Supervising Architect, Washington, D. C., until September 4 for the installation complete of an electric passenger elevator in the post office at McAlester, Okla., in accordance with drawings and specifications, copies of which may be had from the office of the Supervising Architect.

ELECTRICAL EQUIPMENT.—The Bureau of Supplies and Accounts, Navy Department, Washington, D. C., will receive bids until September 8 for furnishing the following electrical equipment under the schedule numbers given and for delivery at the Navy Yards named: Three 50-kilovolt ampere transformers, complete, 7189, Brooklyn, N. Y.; one X-

ray machine of the so-called interrupterless type, 7191, Chelsea, Mass.; 15,000 one-candlepower 10-volt micro incandescent lamps, and 54,000 feet two-conductor cable, 7192, Washington, D. C.; five microfarad condensers, two ringing dynamotors with 120-volt motor and spare parts, one C-72 front-connection-type telephone switchboard and spare parts, 67 telephones, Types HB, D, DB, HBC, and spare parts. 7193, Norfolk, Va.; two direct-current 120-volt 11.5-horsepower motors, 930 revolutions per minute, and spare parts, 7195, Brooklyn, N. Y.

FOREIGN TRADE OPPORTUNITIES.

[Where addresses are omitted they may be obtained from the Bureau of Foreign and Domestic Commerce, Washington, D. C., and at the branch offices of the Bureau, 315 Custom-House, New York, N. Y., 629 Federal Building, Chicago, Ill., Association of Commerce Building, New Orleans, La., and 310 Custom-House, San Francisco, Cal. Apply for addresses in letter form, giving file numbers.]

NO 13,570. ELECTRIC KITCHEN TOOLS AND APPLIANCES.—A well established firm in a European country informs an American consular officer that it desires to hear from American exporters of electric kitchen tools and appliances, including flatirons, cooking apparatus, vacuum cleaners, etc. Correspondence may be in English.

NO. 13,568. INSULATED TAPE FOR ELECTRICAL PURPOSES.—A report from an American consular officer in England states that a manufacturer of and dealer in dry-battery ignition coils, etc., for motor cars, motor boats, and motor cycles desires to communicate with American manufacturers of insulating tape for electrical purposes. He is anxious to secure the English agency for a large and responsible manufacturer to whom he can offer a large contract, to be taken in several deliveries, over specified periods. He states that the matter is urgent and that he would like as quick a response as possible. He also states that he is in position to supply first-class references.

FINANCIAL NOTES.

The Northern California Power Company has asked the Railroad Commission for permission to issue $500,000 par value of preferred stock at $80 a share. The stock is six-per-cent cumulative and the proceeds are to be used to reimburse the company for moneys actually expended from income for construction work.

For the six months ended June 30, 1914, the Ontario Power Company, of Niagara Falls, and the Ontario Transmission Company sold $797,147 of current. Power purchased amounted to $8,500, and Government rental to $48,132, leaving gross earnings for the six months $739,514, an increase of $52,580 over the first six months of 1913. Net earnings were $628,391, as compared with $597,215 for the six months ended June 30, 1913. Receipts from miscellaneous sources brought total income up to $681,467. Interest charges increased $107,132, so that the surplus of $235,251 for the six months was a decrease of $34,783 from that for the corresponding six months of the preceding year.

Authority has been granted the Massachusetts Northeastern Street Railway Company by the Massachusetts Public Service Commission for the issuance of 450 additional shares of common and 6,500 shares of six-per-cent cumulative preferred stock at a par value of $100, together with $1,000,000 in bonds.

The Detroit Edison Company and constituent companies report for July commercial electric earnings of $393,309 and municipal electric earnings of $7,962; sales to street railways were $50,032, and to other public utilities $4,160. Steam sales amounted to $2,928 and non-operating revenue was $6,327. Operating expenses and reserve funds totalled $296,355, an increase of 13.9 per cent, and net income was $168,764, 21.5 per cent higher than in July of last year.

Earnings report of the Philadelphia Rapid Transit Company for July shows gross passenger revenue of $1,879,341, a decrease of $28,808, and receipts from other sources decreased $16,541 to $71,924. Operating expenses were $1,137,702, a loss of $54,829 from July of last year, leaving net earnings of $813,563, $9,482 more than in 1913. Fixed charges amounted to $809,364, a gain of $11,674, and surplus was $4,109, a decrease of $3,192.

The New Jersey Public Utility Commission has approved the taking over by the Public Service Electric Company, a subsidiary of the Public Service Corporation of New Jersey, of the Cinnaminson Light, Power & Heating Company.

The Riverside Traction Company was authorized to issue $51,000 of bonds for construction of a power plant.

The Salt Lake Light & Traction Company, of Salt Lake City, has been incorporated under the laws of Utah with a capitalization of $1,000,000. It is understood that this is the company which will be organized by D. C. Jackling and associates to take over from the Oregon Short Line the common and preferred stocks of the Utah Light & Railways Company, which operates the street railways and electric-lighting and power systems of Salt Lake City and surrounding towns and the electric-light and power and gas systems of Ogden.

Dividends.

	Term.	Rate.	Payable.
American Rys.	Q	1.5%	Sept. 15
Am. Tel. & Cable	Q	1.25%	Sept. 1
Colo. Pr. pf.	Q	1.75%	Sept. 15
Mackay Cos. pf.	Q	1%	Oct. 1
Mackay Cos. com.	Q	1.25%	Oct. 1
No. Ohio Tr. & Lt.	Q	1.25%	Sept. 15
No. Tex. Elec. com.	Q	$1.75	Sept. 1
No. Tex. Elec. pf. S-A		$3.00	Sept. 1
Wis.-Minn. Lt.&Pr. pf.	Q	1.75%	Sept. 1
W. Kootenay Pr. & Lt.	Q	1.25%	Sept. 1

Reports of Earnings.

VIRGINIA RAILWAY & POWER.

	1914.	1913.
July gross	$443,816	$439,688
Net	231,579	230,099
Surplus after charges	101,595	105,237

DAYTON POWER & LIGHT.

Seven months and twelve months ended July 31, 1914:

	1914.	1913.
Seven months gross	$529,996	$377,545
Net earnings	229,016	141,902
Gross income	234,736	153,257
Net income	114,738	39,911
Balance after preferred dividends	49,619	*19,143
Twelve months gross	887,221	674,063
Net earnings	377,843	281,563
Gross income	390,629	303,224
Net income	186,222	114,909
Balance after preferred dividends	78,922	18,918

*Deficit.

MT. WHITNEY POWER & ELECTRIC.

	1914.	1913.
July gross	$ 61,334	$ 52,376
Net after taxes	35,657	31,217
Surplus after charges	23,272	22,092
Twelve months gross	638,956	505,022
Net after taxes	369,081	265,884
Surplus after charges	237,397	167,560

LOUISVILLE RAILWAY COMPANY.

	1914.	1913.
July gross	$ 268,063	$268,413
Net	104,339	98,252
Balance after charges and taxes	31,089	28,085
Other income	19,069	24,372
Surplus	50,158	51,457
Seven months gross	1,860,607	1,853,290
Net earnings	794,379	787,357
Balance after charges and taxes	293,962	300,356
Other income	97,880	106,430
Surplus	391,842	406,786

COMMONWEALTH POWER RAILWAY & LIGHT.

	1914.	1913.
July gross	$222,346	$205,168
Net after expenses, taxes and interest	158,587	150,442
Balance after preferred dividends	78,587	70,442
Twelve months gross	2,998,862	1,778,345
Net after expenses, taxes and interest	2,215,478	1,514,347
Balance after preferred dividends	1,255,478	1,004,347

EDISON COMPANY OF BOSTON.

The estimated earnings of the Edison Company of Boston for the year ended June 30, 1914, compare with actual figures for 1913 as follows:

	1914.	1913.
Gross	$7,010,000	$6,365,874
Expenses	3,100,000	2,724,198
Net	3,910,000	3,641,675
Miscellaneous profits	65,000	103,956
Total net	3,975,000	3,745,631
Taxes	800,000	797,617
Balance	3,175,000	2,948,014
Interest	300,000	300,065
Dividends	2,250,000	1,950,333
Balance for depreciation and miscellaneous shortages	625,000	607,616

CONSUMERS POWER OF MICHIGAN.

For July and seven months and twelve months ended July 31, 1914:

	July.	Seven Months.	Twelve Months.
Gross earnings	$258,355	$1,938,890	$3,322,258
Net after taxes	163,914	1,284,424	2,015,176
Surplus after charges	68,661	631,947	906,722
Balance after preferred dividends	38,661	431,947	569,222

SOUTHERN CALIFORNIA EDISON.

	1914.	1913.
July gross	$407,571	$409,129
Net earnings	230,822	214,712
Gross income	250,082	217,977
Surplus after charges	173,419	146,277
Balance after depreciation	83,416	91,277
Seven months gross	2,734,120	2,693,074
Net earnings	1,357,485	1,356,800
Gross income	1,396,013	1,363,514
Surplus after charges	836,226	852,109
Balance after depreciation	536,226	502,109

TEXAS POWER & LIGHT.

	1914.	1913.
July gross	$130,081	$89,702
Net after taxes	45,078	34,232
Surplus after charges	26,528	17,159
Twelve months gross	1,453,010	1,087,454
Net after taxes	503,905	422,761
Surplus after charges	250,692	262,877
Balance after preferred dividends	119,004	163,389

MONONGAHELA VALLEY TRACTION.

	1914.	1913.
June gross	$90,857	$78,737
Net earnings	53,242	51,323
Surplus after charges	27,707	27,196
Six months gross	494,717	442,066
Net earnings	305,446	290,411
Surplus after charges	152,500	145,751

FORT WORTH POWER & LIGHT.

	1914.	1913.
July gross	$76,861	$53,329
Net after taxes	39,287	31,973
Surplus after charges	32,842	24,241
Twelve months gross	821,390	582,958
Net after taxes	449,501	323,407
Surplus after charges	353,815	249,241
Balance after preferred dividends	292,429	205,841

PERSONAL MENTION.

MR. GEORGE MOSS, of Miltonvale, Kans., was recently appointed city electrician of Esbon, Kans., in charge of the new electric light plant, just established in that city.

MR. K. H. MYERS, former manager of the Gallup (N. M.) Electric Light Company, has succeeded MR. J. F. MASE, resigned, as manager of the People's Light & Power Company.

MR. F. J. McCORMICK has been appointed manager of the Eastern office which the Greenwood Advertising Company, Knoxville, Tenn., has recently opened at 1570 Sansom Street, Philadelphia, Pa.

MR. E. ST. ELMO LEWIS, for many years advertising manager for the Burroughs Adding Machine Company, Detroit, Mich., has been elected vice-president and general manager of the Art Metal Construction Company, Jamestown, N. Y.

MR. H. H. SCOTT, president of the National Electric Light Association, will be one of the guests at the New England Section convention to be held next week at Narragansett Pier. Mr. Scott is scheduled to speak at the banquet on Friday evening.

MR. RAYMOND AKERMAN, special representative of the Capital Electric Company, of Salt Lake City, is making a tour of the eastern cities, visiting the factories and sales offices of many of the companies which his company represents in the Intermountain district.

MR. M. R. HACKETT, manager of the Mount Sterling (Ky.) plant of the Kentucky Utilities Company, has recently taken charge of the Richmond (Ky.) plant of the company, and MR. FRANK BOGARD, formerly superintendent of the Richmond plant, who has been promoted to a higher post by the company, is succeeded in the local plant by MR. ELMER DAVIS, of Winchester.

MR. F. B. UHRIG, western district manager for the Western Electric Company, has been on a tour of inspection recently. Mr. Uhrig states that so far he has not been able to discern any marked effect of the war on the business of his company in western territory. Few large enterprises were in progress at its beginning and the bumper crops being obtained throughout the entire West have tended to sustain the demand for the smaller detail and supply material. He reports a healthy co-operation between the central stations, jobbers, dealers, and contractors throughout the territory.

MR. JAY E. BIGHAM, of the Tampa Electric Company, Tampa, Fla., was elected president of the Southeastern Section of the National Electric Light Association at the annual convention which was held last week. Mr. Bigham was born in Grand Rapids, O., on September 10, 1877. He was educated at the Prima State Normal School. He was early employed in the construction department of the American Bridge Company at Pittsburgh, Pa., and later in the operating department of the American Sheet & Tin Plate Company. During the Spanish-American war he joined the army and served in the Philippines as sergeant in a volunteer regiment, and later as a sergeant-major. Mr. Bigham began electrical work with the Stone & Webster Company in Terre Haute, Ind., in the Terre Haute Electric Company, in 1901. He later became assistant treasurer of the Paducah Light & Power Company, Paducah, Ky. In 1909 he went to Jacksonville, Fla., as assistant treasurer of the Jacksonville Electric Company, and in 1910 became assistant treasurer of the Tampa Electric Company. Mr. Bigham is married and has two children. He is a member of the Tampa Board of Trade, the Elks' Club, and the German Club.

OBITUARY.

MR. THOMAS CONNOR, for many years a district superintendent of construction in the service of the Otis Elevator Company, died on August 21 in the Bushwick Hospital, Brooklyn, N. Y. He was 69 years old, and was not only a veteran employee of the company, but one of the first who went on its pension roll. He leaves a son.

MR. TUNIS JORALEMON POWELL, president of the American District Telegraph Company of Brooklyn, N. Y., died on August 20 at his late residence, No. 37 Garden Place, from heart failure. Mr. Powell was 82 years of age. He became connected with the American District Telegraph Company in 1873 as secretary and treasurer. In 1894 he succeeded Hassan H. Wheeler as president.

NEW PUBLICATIONS.

KANSAS CITY APPRAISAL.—The report prepared by Philip J. Kealy on the value of the property of the Kansas City Electric Light Company and subsidiary companies, as of February 1, 1914, has been published in pamphlet form. The history of the corporation is given, the basis of appraisal, the summary of values and detailed exhibits of the various classifications.

MAGNETIC OBSERVATIONS.—The United States Coast and Geodetic Survey, Washington, D. C., has published the "Results of Observations Made at the United States Coast and Geodetic Survey Magnetic Observatory, near Tucson, Ariz., 1911 and 1912." This is a 104-page report prepared by Daniel L. Hazard, of the Division of Terrestrial Magnetism. It gives very complete tabulated data of observations made, corrections ascertained, etc. Many curve sheets are also included.

TESTING OF POTENTIOMETERS.—The paper by this title presented at the April meeting of the American Physical Society by Frank Wenner and Ernest Weibel is being published as Scientific Paper No. 223 by the Bureau of Standards, Washington, D. C. Copies may be obtained from the director upon request. The paper describes the various methods used in the Bureau of Standards for this work and a convenient procedure for obtaining corrections.

ACCIDENTS FROM FALLS OF ROCK.—The Bureau of Mines, Washington, D. C., has issued Minerals Circular No. 17, entitled "Accidents from Falls of Rock or Ore." This gives the results of a study of accidents in metal mines resulting from falls from the roof of underground workings. Most accidents in these mines occur from falls of ore or rock. The causes of these accidents are explained and illustrated and methods for preventing them are also clearly pointed out.

SAFETY RULES.—Circular No. 49 of the Bureau of Standards, Washington, D. C., is entitled "Safety Rules to be Observed in the Operation and Maintenance of Electrical Equipment and Lines." In addition to introductory matter, it gives rules for the employer, general rules for the employee and special rules for those employees engaged in different kinds of electrical work. These rules should be in the hands of every man engaged in electrical maintenance and operating work.

WASTE OF OIL AND GAS.—The Bureau of Mines, Washington, D. C., has issued Technical Paper No. 45, entitled "Waste of Oil and Gas in the Mid-continent Fields." This publication was prepared by Raymond S. Blatchley and gives the results of a careful study of wastes in the gas and oil fields of Kansas, Oklahoma and the northern part of Texas. Illustrations are given of some operations conducted in these fields; also many plats of the districts investigated are given. Suggestions are made for the prevention of needless wastes of these natural products, and it is urged that the use of proper methods be made compulsory.

NEW INCORPORATIONS.

BUFFALO, N. Y.—The Wooley-James Electric Company has filed articles of incorporation, capitalized at $50,000. The directors are Lloyd A. Wooley, William S. James and John Hora, Jr.

CLEVELAND, O.—The Engein Electric Company has been incorporated, capitalized at $25,000. The incorporators are R. K. Welchi, W. M. Findley, B. J. Guthery, R. E. Williams and H. M. Kodet.

NEW YORK, N. Y.—Geyser Electric Water Heater Company, Incorporated, has been granted articles of incorporation, capitalized at $10,000. The incorporators are David Horwitz, David M. Cohn, and Louis B. Funk.

NEW YORK, N. Y.—Hudson & Son, Incorporated, has been incorporated with a capital stock of $10,000 to deal in electrical machinery. The incorporators are M. L. Hudson, J. H. Mason and W. Miller, all of New York City.

INDIANAPOLIS, IND.—Skillman Electric Company has been incorporated with a capitalization of $10,000 to deal in electrical machinery, supplies, etc. The incorporators are George L. Skillman, C. V. Higgins and E. W. Skillman.

NEW YORK, N. Y.—The Evolution Phone Company, Incorporated, has been granted articles of incorporation, capitalized at $25,000. The company will deal in electrical devices. The incorporators are Thomas E. Styles, Herman G. Pape and Ida B. Pape.

ST. LOUIS, MO.—The St. Louis Electric Company has been incorporated with a capital stock of $20,000 by Stahl A. Whitten, Albert W. Wehmeier, Emil Doerr, Joseph G. Lowe. The company will do a general electrical machinery and appliance business.

BOSTON, MASS. — The United States Electric Generator Company has been incorporated with a capital stock of $50,000. The incorporators are John W. Bond, Providence, R. I.; H. P. Morrissey, Boston; H. M. Spooner, Cranston, R. I.; A. P. Manchester and John Morrissey, Providence. W.

PHILADELPHIA, PA.—Universal Conduit Manufacturing Company has been incorporated to install electric wiring and other device systems. The capital stock is $300,000 and the incorporators are F. R. Hansell, Philadelphia; G. H. B. Martin, Camden, N. J.

DATES AHEAD.

New England Section, National Electric Light Association. Sixth annual convention, Narragansett Pier, R. I., September 2-4. Secretary Miss O. A. Bursiel, 149 Tremont Street, Boston, Mass.

The Colorado Electric Light, Power and Railway Association. Twelfth annual convention, Glenwood Springs, Colo., September 3-5. Secretary, Thomas F. Kennedy, 900 Fifteenth Street, Denver, Colo.

Pennsylvania Electric Association. Annual convention, Eagle Mere, Pa., September 8-11. Secretary, S. E. Pohe, Bloomsburg, Pa.

Northwest Electric Light & Power Association. Annual convention, Spokane, Wash., September 9-11. Secretary, Norwood W. Brockett, Puget Sound Traction, Light & Power Company, Seattle, Wash.

American Institute of Electrical Engineers. Pacific Coast convention, Spokane, Wash., September 9-11. Secretary, F. L. Hutchinson, 29 West Thirty-ninth Street, New York, N. Y.

Electrical Supply Jobbers' Association. Regular quarterly meeting, Clifton Hotel, Niagara Falls, Canada, September 9-11. General secretary, Franklin Overbagh, 411 South Clinton Street, Chicago.

Association of Edison Illuminating Companies. Annual convention, White Sulphur Springs, W. Va., September 14-17. Secretary, George C. Holberton, San Francisco, Cal.

Association of Iron and Steel Electrical Engineers. Annual convention, Cleveland, O., September 14-19. Secretary, W. T. Snyder, McKeesport, Pa.

Old-Time Telegraphers' and Historical Association and Society of the United States Military Telegraph Corps. Thirty-third annual reunion, Kansas City, Mo., September 15-17. Secretary of Old-Timers, F. J. Scherrer, 30 Church Street, New York. Secretary, Military Telegraph Corps, David Homer Bates, 658 Broadway, New York.

International Association of Municipal Electricians. Annual convention, Atlantic City, N. J., September 15-18. Secretary, C. R. George, Houston, Tex.

Illuminating Engineering Society. Annual convention, Cleveland, O., September 21-25. Assistant secretary, Joseph Langan, 29 West Thirty-ninth Street, New York, N. Y.

American Electrochemical Society. Twenty-sixth general meeting, Niagara Falls, Canada, October 1-3. Secretary, Joseph W. Richards, South Bethlehem, Pa.

American Electric Railway Association. Annual convention, Atlantic City, N. J., October 12-16. Secretary, E. B. Burritt, 29 East Thirty-ninth Street, New York, N. Y.

Jovian Order. Annual congress, St. Louis, Mo., October 14-16. Mercury, Ell C. Bennett, Syndicate Trust Building, St. Louis, Mo.

Electric Vehicle Association of America. Fifth annual convention, Philadelphia, Pa., October 19-21. Secretary, A. J. Marshall, 29 West Thirty-ninth Street, New York, N. Y.

Telephone Pioneers of America. Annual reunion, Richmond, Va., October 29-30. Secretary, Henry W. Pope, New York City.

With the Electrical Manufacturers

The Thompson Electric Company, Cleveland, O., manufacturer of Thompson safety cutout hangers, announces its removal from 377 Superior Avenue Northwest, Cleveland, O., to 5606 Euclid Avenue.

The Dicke Tool Company, 61 Broadway, New York City, has on the press a new catalog on tools for linemen's construction work. Copies of the catalog will be ready for distribution to those interested on or about September 1.

General Electric Company, Schenectady, N. Y., has recently secured an important order through its Sale Lake City office. This was a contract obtained from the Utah Copper Company for 188 compensators to be used in starting induction motors in the company's mills where the flotation process is employed for the treatment of ores.

Weston Electrical Instrument Company, Newark, N. J., has issued two bulletins dealing with a new line of instrument transformers. Bulletin 1501 illustrates and describes the new switchboard instrument transformers, and Bulletin 2001 the portable types. These transformers are of exceptionally high grade in accuracy, design, workmanship and reliability.

American Electrical Works, Phillipsdale, R. I., has issued its price list, dated August 15. This gives prices of bare copper wire and cables, weatherproof wires and cables, stranded cables, galvanized wires, coarse magnet wires, flat magnet wire, annunciator wire, office wire, rubber-covered wire, incandescent-lamp cord, reinforced portable cord, Americanite lamp cord and portable cord, etc.

Independent Electric Manufacturing Company, Milwaukee, Wis., has issued a cleverly prepared booklet entitled "How the Blind Man Was Cured." Beginning with a number of fables, it shows how the manager of an industrial power installation frequently is blind to the actual cause of shutdowns. The advantages of using the company's starters for motor installations are pointed out.

C-A-Wood-Preserver Company, St. Louis, Mo., has issued in the form of a large poster a warning to users of wood preservatives to make a careful examination lest many test reports now being circulated in regard to the alleged superiority of creosote treatment over the C-A-Wood-Preserver may bring about misleading conclusions. The company has also issued in the form of a curve-sheet comparative volatility curves of coal-tar creosote and its special wood preserver.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has issued a very interesting, illustrated booklet entitled "The Young Man and the Electrical Industry." It is a story written by James H. Collins, the well known magazine writer, and reprinted from the *Scientific American*. It deals with the opportunities afforded a young man in this industry and the different lines in which he may direct his activities, as exemplified by the works of the Westinghouse company. The company announces that it will supply a copy to anyone interested in the development of young men.

S. R. Bailey & Company, Incorporated, 895 Boylston Street, Boston, Mass., has ready a number of new bulletins covering its electric vehicles. Bulletin No. 30 describes the Model F Bailey electric roadster; this is the type of car that has made such remarkable records in cross-country touring. The supplement to bulletin No. 30 desribes the four-passenger roadster, which is similar in equipment to the Model F, but is a larger car. Bulletin No. 22 is devoted to Bailey electrics for business purposes; it describes the runabout, light-service car and delivery wagon. All of these cars are equipped with the Edison storage battery. In a separate publication the company published the answers to four common questions in regard to the Bailey electric roadster, the length of time it takes to charge it, the cost of the charge and where the battery can be charged. The answers to these questions are clearly given and include numerous valuable data.

Western Electric Company, Chicago, Ill., and New York City, has issued a new catalog of magneto telephones and supplies. This deals with standard telephone equipment of the magneto type used by companies supplying about 200 telephones or less. Several types of these telephones are described and illustrated; magneto switchboards of various types, hand generators and other parts of the telephone and switchboard equipment, tools used in line construction, poles, cross-arms, pins, hardware, wire, insulators and other construction materials are also listed. The company has also issued a new catalog of telephone cords. This covers switchboard cords, operators' and other miscellaneous central-office cords, receiver, transmitter, desk stand and other telephone-set cords, miscellaneous cords, cord tips, etc. The catalog has a very large number of detail and dimension diagrams. It also shows the correct and incorrect ways to insert and remove switchboard plugs. The testing of Western Electric cords is also described.

Record of Electrical Patents.

Issued by the United States Patent Office, August 11, 1914.

1,106,368. Electrical Apparatus. F. Conrad, assignor to Westinghouse Electric & Mfg. Co. Combination constant-current transformer and mercury-arc rectifier.

1,106,372. Automatically Operated Switch. C. W. Eisenmann, Chicago, Ill. Electromagnetic differential switch for connecting storage battery to dynamo.

1,106,381. Electrode for Furnaces. C. Hering, Philadelphia, Pa. Comprises a shell of conducting material increasing in thickness from its outer toward its inner end.

1,106,384. Incandescent Body for Electric Lamps. W. G. Hughes, Pittsburgh, Pa. Filament of annealed and drawn pure metallic uranium.

1,106,386. Fuel-Vaporizer for Explosion Engines. H. H. Ingersoll and C. B. Ingersoll, Chicago, Ill., assignors to Ingersoll Electric Vaporizer Co. Electrical heating element surrounds intake.

1,106,387. Rail Contact for Vehicles. E. Jenoi and J. Stevenson, Jenkins, Ky., said Jenoi assignor to S. Kruchio, R. M. Szabo, and S. Kruchio, Uniontown, Pa. Locomotive contact rollers pressed against rail.

1,106,411. Hair-Drying Comb. G. L. Scheel, Chicago, Ill. Electrically heated.

1,106,416. Time-Switch Mechanism. J. A. Skinner, assignor to F. F. Uehling, Passaic, N. J. For an electric motor.

1,106,432. Ignition System. E. C. Wilcox, assignor to Connecticut Telephone & Electric Co., Meriden, Conn. Includes automatic switch to cut out battery when engine has stopped.

1,106,436. Electrolytic Manufacture of Alkali Metals. E. A. Ashcroft, London, England. Electrolyte contains caustic soda and sodium cyanide.

1,106,441. Signaling Mechanism. H. C. Crumrine, Cleveland, O. Electromagnetic direction indicator for automobiles.

1,106,442. Electric Plug. F. Deiser, assignor to Chi-Ill. Electric Company, Chicago, Ill. Screw shell is rotatable about body.

1,106,459. Lamp Socket. G. C. Knauff, Chicago, Ill. Has compression spring between main and auxiliary casings.

1,106,463. Credit-Marking Apparatus. J. J. Leidigh, assignor to National Cash Register Co., Dayton, O. Electromagnetic trip for punch.

1,106,468. Electric Transmission Line. L. Michod, Chicago Heights, Ill. Independent strain wire is attached to middle of poles and guyed.

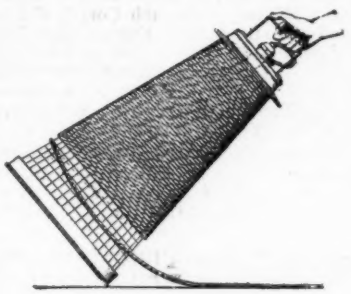
1,106,469. Automatic Motor Control. S. Mitchell, Somerville, Mass., assignor of one-third to J. W. Smith. Has electromagnetic resistance switches.

1,106,476. Electric Soldering Iron. J. C. Royce, Toronto, Ont., Can. Has pair of heating elements in head.

1,106,486. Electric Furnace. G. H. Benjamin, New York, N. Y. Induction furnace with movable secondary formed of annular crucible and its charge.

1,106,501. Call-Registering Telephone. F. D. Fader, J. Tibb, and J. W. Tibb, Vancouver, B. C., Can. Comprises call box, relay, recording mechanism and disconnect switch.

1,106,510. Electrical System of Distribution. A. S. Hubbard, assignor to Gould Storage Battery Co. Storage battery is arranged to discharge fluctuatingly at same frequency as alternating current supply.



1,106,631.—Floor Lamp.

1,106,513. Electric Motor. D. C. Jackson, Madison, Wis. Alternating-current commutator motor of repulsion type.

1,106,514. Dynamo-Electric Machine. D. C. Jackson. Modification of above.

1,106,525. Igniter. H. C. Thompson, Boston, and H. N. Michaelsen, Canton, Mass., assignors to Electric Goods Mfg. Co. Combination spark plug and coil.

1,106,540. Renewal Element for Semi-Drycell Batteries. W. Broad, Beaver Falls, Pa. A dry cake of depolarizing material and absorbent material containing electrolyte.

1,106,761.—Bushing and Coupling.

1,106,572. Insulating Joint for Pipe Systems. A. J. Loepsinger, assignor to General Fire Extinguisher Co., Providence, R. I. For sectionalizing sprinkler piping.

1,106,576. Electromechanical Switch. R. R. Miller, Pueblo, Colo., assignor to Miller Electric Switch Co. Combined solenoid and spring-controlled plunger.

1,106,592. Telephone System. F. E. Summers, Memphis, Mo. Party-line system.

1,106,593. Electric Switch. B. P. Swyers, Pittsburgh, Pa., assignor of parts to B. P. Swyers, G. E. Lorch, G. M. Davis, M. Maul, L. Lorch, Jr., and J. H. Wagner. For ignition system.

1,106,631. Inverted Lamp. W. J. Davis, Jr., Chicago, Ill. For illuminating floors. (See cut.)

1,106,639. Motor Switch. O. B. Duncan, assignor to George Cutter Co., South Bend, Ind. Has spring mechanism to throw the switch from starting to running position.

1,106,655. Telephone Call-Bell or Ringer. W. Kaisling, assignor to Kellogg Switchboard & Supply Co., Chicago, Ill. A biased bell.

1,106,680. Substation Signal-Receiving Device. H. O. Rugh, Sandwich, Ill., assignor to Hall Switch & Signal Co. Selective receiver for train dispatching.

1,106,683. Electric Web-Drying Machine. J. C. Sherman, assignor to H. Parker, Berlin, N. H. Primary winding is on stationary core and short-circuited secondaries are formed of tubular drums.

1,106,685. Lighting Fixture. E. M. Smith, assignor to Multi-Lux Illuminating Co., Cleveland, O. A semi-indirect fixture supported from a pendant lamp socket.

1,106,699. Myringscope. G. G. Carroll, assignor to Electro Surgical Instrument Co., Rochester, N. Y. Includes an incandescent lamp.

1,106,703. Sparking Plug. O. Freiberg, Gautzsch, near Leipzig, Germany. Has a large number of crosswise-arranged parallel rows of auxiliary contacts.

1,106,710. Recording Electric Meter. C. H. Ingalls, assignor to General Electric Co. Time-actuated electromagnetically controlled auxiliary to meter.

1,106,719. Battery. S. Lake, Milford, Conn. Electrolyte is supplied to the cells in drops in rain-like manner.

1,106,729. Wireless Telegraph Installation for Aerial Vessels. L. Rouzet, Paris, France. Includes a flying antenna secured to the aeroplane.

1,106,750. Telegraph System. B. F. Thompson, Arlington, Md. Has alternating-current supply.

1,106,761. Self-Locking Junction Box Coupling. A. W. Weikert and J. Pettibone, Washington, D. C. Spring bushing for clamping conduit to box. (See cut.)

1,106,762. Electric Writing Telegraph. E. H. Widegren and K. A. Widegren, Alby, Sweden. Oscillating electromagnetic devices control the recording pin.

1,106,789. Arc Lamp. H. E. Davies, West New York, N. J. Describes a new electrode feed.

1,106,797. Electric Insulator. J. L. Fay, St. Louis, Mo., and S. B. Way, Milwaukee, Wis. One unit of a suspension or strain insulator is shaped to induce circulation of air about it and to rupture any arc.

1,106,807. Pendulum Lamp for Clocks. C. R. Hanson, Waterloo, Iowa. Electrically lighted.

1,106,819. Playing Apparatus for Musical Instruments. J. F. Kelly, Pittsfield, Mass. Electrically operated player piano.

1,106,821. Electric Conductor Take-Up. D. C. Lamb, assignor to Lamb Bros. & Greene, Nappanee, Ind. Spring cord-take-up reel for drop lamp in canopy or for base of portable lamp.

1,106,823. Trolley Guard. J. Lawton, assignor to Notwal Co., Newark, N. J. Guard plates at sides of wheel.

1,106,828. Portable Electric Lamp. W. J. Monaghan, assignor to Waterbury Mfg. Co., Waterbury, Conn. Hand lamp with dry cell and push-button.

1,106,855. Wire Connector. G. S. Wills, Twin Buttes, Ariz. Includes a plug clamp.

1,106,874. Wireless Apparatus. P. L. Jensen, assignor to Commercial Wireless & Development Co., San Francisco, Cal. Has means for eliminating the effect of atmospheric electricity.

1,106,875. Wireless Apparatus. P. L. Jensen and E. S. Pridham, assignors to Commercial Wireless & Development Co. An amplification of the above.

1,106,876. Spreading Rail Indicator. E. Kaddatz, Ortonville, Minn. Includes an electric alarm.

1,106,907. Electric Contact Maker for Flow Meters. J. Wilkinson, assignor to General Electric Co. Mercury contact device.

1,106,911. Protector. J. Zwilling, assignor to Western Electric Co. Lightning protector for low-potential circuits.

1,106,922. Selector. A. M. Bullard, assignor to Western Electric Co. For telephone train dispatching.

1,106,936. Electrically Operated Stereotype Matrix-Drying Machine. R. J. Gibbons, New York, N. Y., assignor to Ostrander Seymour Co. Motor-driven.

1,106,945. Antenna for Wireless Telegraphy. N. J. Jeffries, Atlantic City, N. J. A portable collapsible outfit.

1,106,953. Spark-Controlling Device for Magneto Ignition. H. H. Lanning, Topeka, Kans. Has special gear mechanism.

1,106,960 and 1,106,961. Electric Glow Lamp. W. Nernst, assignor to Nernst Lamp Co., Pittsburgh, Pa. A Nernst lamp glower composed of an intimate mixture of yttria and tungstic acid.

1,106,971. Filament Mounting. H. C. G. Remane, assignor to General Electric Co. The anchor has a fork-shaped engaging part.

1,106,973. Signaling Device. E. Rogers, Glenville, Conn. Electric audible and visual signal.

1,106,974. Lamp Socket. G. F. Rush, Chicago, Ill. Outer edge of screw shell has teeth to hold it against the inner wall of porcelain body.

1,106,975. Electric Heater for Fans. A. Schaeffer, Frankfort-on-the-Main, Germany. Includes removable heating elements.

1,106,982. Automatic Automobile Rear Signal. J. Wm. Stachnick, Baltimore, Md. Has electric lamps and electromagnetically operated semaphore arms.

1,107,000. Short-Circuiting Attachment for Gas-Engine Igniters. C. M. Weeks and H. N. Jackson, Babylon, N. Y. Has a pair of pivoted jaws.

1,107,013. Circuit-Closer. A. G. Anderson, Clay Center, Neb. A duplex push-button.

1,107,024. Telephone. L. S. Boyce, Rockwell City, Iowa, and O. E. Boyce, Glencoe, Minn. Party-line instrument with special listening button.

1,107,040. Revolver Flashlight. J. B. Conde, Philadelphia, Pa. Electric flashlight attachable to firearm.

1,107,061. Arc Lamp. C. A. B. Halvorson, Jr., assignor to General Electric Co. Luminous-arc lamp has arrangement for removing arc deposits from the electrode.

1,107,084. Vent and Overflow for Batteries. C. T. Mason, Sumter, S. C. Special inner cover for storage cell.

1,107,099. Rotary Electric Switch. M. K. Ownbey, Shawnee, Okla. Cylindrical flasher switch for sign lamps.

1,107,111. Insulator. B. S. Purkey, Tacoma, Wash. Line wire lies in transverse slot and is held by spring clip.

1,107,120. Plural Socket. F. E. Seeley, assignor to Bryant Electric Co., Bridgeport, Conn. Twin sockets with pull chain between the sockets.

1,107,127. Electric Action for Organs. J. T. Austin, assignor to Austin Organ Company, Hartford, Conn. Note-sounding devices are arranged in branch electric circuits.

1,107,130. Organ Action. J. T. Austin, assignor to Austin Organ Co. Electrically controlled.

1,107,133 and 1,107,134. Telephone Exchange System. E. E. Clement, assignor to F. C. Stevens, Attica, N. Y. Semi-automatic system.

1,107,135. Telephone Exchange System and Apparatus. E. E. Clement, assignor to F. C. Stevens. Relates to exchange equipment of semi-automatic system.

1,107,136 and 1,107,137. Telephone Exchange System. E. E. Clement, assignor to F. C. Stevens. Includes an automatic selector switch distributing the calls among the operators.

1,107,138. Automatic Telephone Exchange System. E. E. Clement, assignor to F. C. Stevens. Includes a primary selector switch and several automatic connecting switches.

1,107,145 to 1,107,148. Telephone Exchange System. E. E. Clement, assignor to F. C. Stevens. These five patents cover different features of a semi-automatic system.

1,107,144. Telephone System. E. E. Clement, assignor to F. C. Stevens. Relates to the signaling of a semi-automatic system.

1,107,145 to 1,107,148. Telephone Exchange System. E. E. Clement, assignor to F. C. Stevens. Four patents on different features of a partly automatic system.

1,107,149. Selective Apparatus for Systems of Communication. E. E. Clement, assignor to F. C. Stevens. Includes a number of relays and electromagnetically driven step-by-step selectors.

1,107,150 and 1,107,151. Telephone Exchange System. E. E. Clement, assignor to F. C. Stevens. First patent relates to an impulse signal-transmitting device; second patent to the selector switches.

1,107,152. Telephone Exchange System. E. E. Clement, Washington, D. C. Semi-automatic selective equipment.

1,107,153. Electric Switch. E. E. Clement. Automatic telephone switch of simple construction.

1,107,154. Telephone Exchange System. E. E. Clement, assignor to F. C. Stevens. Automatic traffic distributor with main and auxiliary switchboards.

1,107,155 and 1,107,156. Telephone Registering System. E. E. Clement, assignor to Telephone Improvement Co., Attica, N. Y. For automatically recording the handling and duration of each call.

1,107,157. Telephone Exchange System. E. E. Clement, assignor to F. C. Stevens. Special ringing arrangement.

1,107,176. Timing Mechanism. H. C. Nicholaus, assignor of one-half to F. H. Rateick and one-half to W. J. Looman, Detroit, Mich. Clock-controlled means for opening and closing the switch.

1,107,228. Agricultural Trolley System. E. W. Sanderson, New York. Includes a tractor for running back and forth along the feeders and means for pulling the feeders laterally.

1,107,232. Internal-Combustion Engine. C. C. Nichols and W. H. Wright, assignors to Nichols & Wright Motor Co., Buffalo, N. Y. Special interlock between the electric ignition and a valve for preventing air charge.

1,107,233. Resistance Element. C. N. Moore, assignor to General Electric Co. Resistance conductor is placed centrally in a closed metallic tube filled with powdered insulating material.

1,107,234. Horsepower Indicator and Recorder. L. N. Morscher, Lawrence, Kans., assignor to himself and I. Hill. For electrically recording the power transmitted by a belt.

Patents Expired.

The following United States electrical patents expired August 24, 1914:

588,591 and 588,592. Electric battery. W. Mills, Elizabeth, N. J.

588,602. Dynamo-Electric Machine. L. C. Rice, St. Louis, Mo.

588,610. Electric Arc Lamp. T. Spencer, Philadelphia, Pa.

588,669. Electric Wick-Lighting Device. H. Van Hoevenbergh, New York, N. Y.

588,670. Counting and Signaling Apparatus. B. E. Waters, Brockton, Mass.

588,683. Electric-Lighting System. F. W. Lord, Boston, Mass.

588,686. Electric Cutout. N. Marshall, Boston, Mass.

588,692. Armature for Induction Motors. A. L. Cushman, Concord, N. H.

588,695. Electric Burglar-Alarm. H. M. Dumas, Detroit, Mich.

588,771. Electric Connection between Railway Rails. F. Marsellis, Peralta, Cal.

588,791. Electric Rail-Bond. W. B. Cleveland, Cleveland, O.

588,797. Electrical Keg-Register. W. Kraft, Baltimore, Md.

588,822. Electric Arc Lamp. B. F. Greene, Sheridan, Pa.

588,831. Electrical Transmission of Power. E. Lanhoffer, Mülhausen, Germany.

588,880. Electrical Indicator for Valves. W. J. Rickard, Philadelphia, Pa.

588,890. Incandescent-Electric-Lamp Support. E. L. P. Wetmore, Marquette, Mich.

588,905. Active Material for Electrodes of Electric Accumulators. S. Hammacher, Berlin, Germany.

588,933. Electrically Operated Ship-Cleaning Device. E. T. Thomas, New York, N. Y.